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PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.



119TH SESSION.

FROM NOVEMBER 1906 TO JUNE 1907.

LONDON:
PRINTED FOR THE LINNEAN SOCIETY,
BURLINGTON HOUSE, PICCADILLY, W.,
BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

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Publications of the Society issued during the period, 31st July, 1906, to 31st July, 1907:—

Journal (Botany), No. 261, 18th Oct., 1906.

„ 262, 1st Nov., 1906.

„ 263, 11th July, 1907.

„ (Zoology), No. 195, 24th May, 1907.

Transactions (2nd Ser. Botany), Vol. VII. Part v., March 1907.

„ (2nd Ser. Zoology), Vol. IX. Part xi., March 1907.

„ xii., July 1907.

Vol. X. „ vi., Oct. 1906.

„ vii., May 1907.

Proceedings, 118th Session, from Nov. 1905 to June 1906:

October 1906.

List of [Fellows, Associates, and Foreign Members], 1906-1907.

PROCEEDINGS
OF THE
LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND NINETEENTH SESSION,
1906-1907.)

November 1st, 1906.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

Before proceeding to the business of the Meeting, the President called attention to the redecoration of the Meeting-room during the recess, and the new carpet which was the gift of one of our Fellows, Mr. HERBERT DRUCE, for which the Council had passed a special vote of thanks.

The Minutes of the General Meeting of the 21st June, 1906, were read and confirmed.

Mr. Henry Robert Knipe was admitted a Fellow.

Mr. Morley Thomas Daw, Dr. Arthur Thomas Masterman, and Mr. James Anthony Weale, were severally elected Fellows.

Mrs. Harriet Isabel Adams, the Rev. Alfred John Campbell, Mr. James Drummond, Mr. John Stanley Gardiner, M.A. Mr. Joseph Jackson Lister, F.R.S., Mr. John Mastin, Mr. John Clark Newsham, Mr. Montagu Austin Phillips, Miss Harriet Richardson, Miss Cora Brooking Sanders, and Mr. Walter Henry Young, were proposed as Fellows.

The PRESIDENT exhibited spirit-specimens of young Plaiice
LINN. SOC. PROCEEDINGS.—SESSION 1906-1907. 6

hatched and reared in captivity at Port Erin, Isle of Man, and pointed out the different rate of growth occasioned by different surroundings at the station.

Mr. GEORGE TALBOT exhibited abnormal specimens of *Equisetum maximum*, Lam. (syn. *E. Telmateia*, Ehrh.), from Broxbourne, Herts, where they grew on dry ground and in a narrow area. They were characterised by the development of a fruiting zone on an otherwise typical sterile stem; one specimen showed a prolongation of the stem bearing branches beyond the cone; another showed an extremely reduced cone borne on the summit of a branch.

Mr. L. Boodle, F.L.S., made some observations on these specimens, which he supplemented by drawings from the fresh material, copies of figures from Milde and from Čelakovský.

Prof. F. E. Weiss, F.L.S., also sent three lantern-slides for exhibition, of specimens of the same species from one spot near Stockport which annually produces normal and abnormal cones from the same rootstock.

Prof. J. W. H. Trail and Mr. W. C. Worsdell also spoke.

The GENERAL SECRETARY exhibited a collotype print, 42 cm. × 33 cm., two-thirds the size of the original portrait of Carl von Linné, by P. Krafft, which had been presented by Herr J. Cederquist of Stockholm. It had been prepared for the forthcoming 200th anniversary of the birth of Carl von Linné, and was considered an admirable specimen of collotype printing.

The following papers were read and discussed :—

Sir DIETRICH BRANDIS, K.C.I.E., F.R.S., F.L.S.—“On the Structure of Bamboo Leaves.”

Dr. J. G. DE MAN.—“Crustacea from the Inland Sea of Japan.”
(Communicated by Dr. W. T. CALMAN, F.L.S., F.Z.S.)

Prof. A. J. EWART, D.Sc., F.L.S.—“The Systematic Position of *Hectorella caespitosa*, Hook. f.”

November 15th, 1906.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 1st November, 1906, were read and confirmed.

Mr. William Francis Cooper was admitted a Fellow.

The President announced the death of Mr. WILLIAM MITTEN, A.L.S.

The Rev. T. R. R. STEBBING exhibited Mr. J. G. Pilter's Chart of the Metric System, published by the Decimal Association. He strongly commended the simplicity and clearness with which the system was presented by this graphic method, needing so few words of textual explanation. At the same time he thought that some of the technical terms were open to objection either in regard to spelling or formation. We have long had in English the word *meter* for measurements quite distinct from those of the comparatively recent French *mètre* and *millimètre*. These and similar words, therefore, now to be borrowed from the French, should preferably retain their French terminations, following the English (though not the American) usage in such words as *centre*. Further, the words *hectogram*, *hectometer*, *hectoliter*, were unfortunate and misleading, since they appear to come from the Greek *ἑκτος*, meaning "the sixth," whereas their real connection is with *ἑκατόν*, meaning "a hundred," so that they ought to be respectively *hecatogram*, *hecatometre*, *hecatolitre*. *Are*, for 100 square metres as the unit of surface measure, is not a particularly welcome addition to the English language, and *hectare*, for 100 ares, ought to be either *hecatare* or *hecatontare*. Still, defects in the terminology should not divert attention from the importance of the system itself and the desirability that students of science should be fully acquainted with its character and merits.

Dr. Rendle made some brief remarks on the Chart.

On behalf of Mr. JOHN CRYER, of Shipley, the General Secretary exhibited a series of 21 specimens of *Polygala amarella*, Crantz, selected to show its wide range of form under various conditions. The species was discovered at Grassington in May 1902, and specimens were shown at the General Meeting, 4th December, 1902. In a communication which was sent with the plants, Mr. Cryer states that this species, which grows on the Great Scar Limestone, in the West Riding of Yorkshire, was to be seen the past season in great abundance over a large area. It could be found in many situations and at various altitudes from Sweet Side, Grassington, to Buckden Pike, a distance of about nine miles as the crow flies; from Buckden Pike to Arncliffe, four and a half miles; from Arncliffe to Gordale, five and a half miles; and from Gordale through Bordley to Sky Horne, four miles. These districts embrace an area, as measured on the Ordnance Map, of about thirty-six square miles.

The first six specimens shown were from three to eight inches high, from an elevation of 750 feet; as the elevation increased, the height diminished, till the plant became less than one inch high.

Blue-flowered specimens were found well distributed over the whole area; white-flowered specimens were unequally distributed; rose-coloured plants were only found in one locality, but there it was locally abundant. Spathulate rosettes of root-leaves are the winter state of the plant.

One characteristic of *Polygala amarella* is, that it can grow

where there is but little soil for its support. Mr. Cryer has found it growing on what was almost bare rock; it has the habit of thrusting its roots into the cracks and crevices of rocks or between the stones and rocky fragments. Wherever he has found it, with one exception, there has been little or no depth of soil.

Mr. Cryer has compared *P. austriaca*, Crantz, a closely allied species in Kentish localities, and points out that the latter has a less condensed habit, with smaller, uniformly lilac-blue flowers, more scattered on the stem; cauline leaves smaller, less pointed at the apex; and only traces of a basal rosette of leaves.

The Rev. John Gerard, S.J., and Dr. A. B. Rendle referred to certain interesting points raised by this exhibition.

The paper of the evening was by Mr. HORACE W. MONCKTON, Treas. & V.-P., "On the Fjærlands Fjord, Norway."

During the past summer the Author spent a fortnight at Mundal on the Fjærlands Fjord, and he had paid short visits to the same place in previous years. The fjord is a long arm running from the Sogne Fjord in a north-easterly direction, and snow-fields lie near the fjord on both sides, though at a considerable altitude above it. Mundal is about 90 miles from the open sea, but *Fucus* grows well on the rocks and foreshore and *Mytilus* and *Cardium* flourish.

In August 1898 the Author found a colony of *Mya arenaria*, Linn., living on the foreshore a little above low-water mark at the head of the fjord; and he exhibited some specimens at the Meeting of the Society on January 19th, 1899 (Proc. Linn. Soc. 1898-9, p. 6). Last August he could not find any living shells, though they might possibly have been found had he been able to carry his examination below low-water mark. He, however, found a large number of dead shells remaining in the muddy sand in the position of life, with the valves united and filled with sand or mud. Fossil-beds with the shell in the position of life are occasionally met with. Mr. H. B. Woodward mentions an instance in the Crag at Bramerton Common, near Norwich ("Geology of the Country around Norwich," Mem. Geol. Survey, 1881, p. 82); and the Author thought the Fjærland case a good example of such a fossil-bed in process of making.

The Author then drew attention to the question to what extent the snow-fields and glaciers of Norway can be looked upon as relics of the Glacial Period, and in this connection he referred to a paper by Mr. J. Rekstad, of the Norwegian Geological Survey ("Skoggransens og snelinens større høide tidligere i det sydlige Norge," Norges geol. Undersøgelse, No. 36, Aarbog for 1903: Kristiania, 1903). Mr. Rekstad quotes several authors who have recorded the occurrence of trunks and relics of the Scotch Fir (*Pinus sylvestris*) in bogs at a level much above the present topmost limit of that tree; and he infers that the topmost limit of the tree has sunk as much as 1100 feet in the central part of Southern Norway. The question then arises: If the limit of the

Pine was so much higher than at present, must not the snow-line have been raised to a corresponding amount? If, however, the snow-line were raised 1100 feet, the snow-fields would in most cases vanish and in a few others be very small, and the larger glaciers would probably cease to exist. Now the bogs in which the air-remains are found are almost certainly more recent than the main part of the Glacial Period—in short, post-Glacial in the ordinary sense of the term; and if the above inference be correct, the present snow-fields and glaciers can scarcely be called relics of the Glacial Period.

In conclusion the Author exhibited a series of photographs of the snow-fields and glaciers around the Hjerlands Fjord.

An animated discussion followed the reading of the paper (which was illustrated by numerous lantern-slides from the Author's photographs), in which the President, Mr. Swinhoe, Sir H. Harcourt, K.C.L.E., F.R.S., visitor, Mr. W. Whitaker, F.R.S., visitor, Dr. Trautler, and Prof. Dudgey took part, Mr. Monckton replying.

December 6th, 1906.

Prof. W. A. HERDMAN, F.R.S., President, in the chair.

The Minutes of the General Meeting of the 14th November, 1906, were read and confirmed.

Colonel John William Yachart was admitted a Fellow.

Miss Mary Anderson Johnston, B.Sc.Lond., was proposed as a Fellow.

The following were proposed for election as Associate in place of the late Mr. William Mitten, A.L.S.:—Mr. Herbert Clinton Chadwick, Mr. William Fildes, Mr. James Lowan, Mr. Arthur Patterson, and Mr. William Henry Pearson.

The following were severally balloted for, and elected Fellows:—Mrs. Harner Isabel Adams, the Rev. Alfred John Lambell, Mr. James Drummond, Mr. John Stanley Gardner, M.A., Mr. Joseph Jackson Lister, F.R.S., Mr. John Manton, Mr. John Clark Newsham, Mr. Monagu Austin Phillips, Miss Harriet Richardson, Miss Corn Florence Sanders, and Mr. Walter Henry Young.

The GENERAL SECRETARY having by desire of the President explained the foundation and constitution of the Linnean Medal in 1888, the President handed to Mr. H. C. Gurnham, F.S.A., Keeper of the Department of Coins and Medals in the British Museum, a silver copy of the said Medal, for the National Collection under his charge. Mr. Gurnham, in acknowledging the

gift, referred to the difficulty his department experienced in procuring specimens of modern medals, which were usually restricted in number and rarely came into the market.

The Rev. H. PUREFOY FITZGERALD, F.L.S., exhibited specimens and a water-colour drawing of *Siegesbeckia orientalis*, Linn., which has been recently described as a valuable external curative agent in skin diseases. (Abstract, p. 73.)

Mr. A. O. WALKER, F.L.S., exhibited cut specimens of *Choisya ternata*, H. B. K., which were now in full flower in his garden near Maidstone. These bushes had flowered normally last May, but the present flowering he attributed to the drought of last season acting as a resting-period to vegetation, which is usually performed by the cold of winter.

Dr. A. T. MASTERMAN, F.L.S., showed an abnormal specimen of the common Dab with three eyes, which had been obtained from the Dogger Bank. He was unable to give a full account, as the specimen has not yet been dissected.

The following papers were read and discussed:—

Prof. A. J. EWART, D.Sc., F.L.S.—“The Physiology of the Museum Beetle, *Anthrenus museorum* (Linn.), Fabr.”

Mr. E. R. BURDON, M.A., F.L.S.—“Note on the Origin of the name *Chermes* or *Kermes*.”

Messrs. E. W. L. HOLT and L. BYRNE.—“Biscayan Plankton.—Part X. Fishes.” (Communicated by Dr. G. HERBERT FOWLER, F.L.S.)

December 20th, 1906.

Lieut.-Col. PRAIN, C.I.E., F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 6th December, 1906, were read and confirmed.

Mr. John Mastin, Mr. George Stephen West, and Miss Cora Brooking Sanders were admitted Fellows.

Mr. Charles Arnold Newman, B.A. (Cantab.), and Mr. Arthur William Garrard Bagshawe, M.B. (Cantab.), were proposed as Fellows.

Mr. WILFRED MARK WEBB, F.L.S., exhibited two specimens of albino woodlice, *Oniscus asellus*, Linn. Prof. Poulton enquired whether either specimen had recently moulted, which would account for the absence of colour. Mr. Webb, in reply, said that was not the case in one, at least, of the specimens shown.

Mr. N. E. BROWN, A.L.S., exhibited a photograph and dried specimens of *Fockea capensis*, Endl., a plant of considerable interest on account of its great rarity and its apparent great longevity. It was originally described and figured by N. J. Jacquin, a hundred years ago, in his 'Fragmenta Botanica,' p. 31, t. 34. f. 5, as *Cynanchum crispum*, from a plant which had been introduced from South Africa and cultivated in the Imperial Garden at Schönbrunn. In 1838, Endlicher, in his 'Iconographia Generum Plantarum,' refigured the plant and generically separated it from *Cynanchum* on account of its remarkable structure. This self-same individual (from which both the above-mentioned figures were made) has been in cultivation at Schönbrunn from Jacquin's time until now, and is the only example of the species known, since Dr. A. Zahlbruckner states that all attempts to propagate it have failed, and no collector appears to have refound it, the only dried specimen in existence, so far as known, being the one exhibited. The living plant was exhibited at the Botanical Congress held at Vienna in 1905, and in the Report of that Congress, p. 77, is a note concerning it, where it is stated that the age of the plant is probably about 150 years. But when Jacquin described the plant 100 years ago, he stated that the tuber was about 1 foot long and 6 inches thick; at the present time, from calculations I have made from the photograph of the plant by comparing the length of the largest leaves on the dried specimen with those of the photograph, I find that the tuber is about $7\frac{1}{3}$ inches thick and stands about $12\frac{1}{4}$ inches above the ground. As this small increase in size during 100 years has been obtained under the conditions of cultivation, where the plant would obtain more moisture and be likely to grow more rapidly than in the very dry climate of its natural habitat, it would appear conclusive that its growth is extremely slow, and that the actual age of the individual in question is probably much more than 150 years. Burchell, in a note with a dried specimen of the very closely allied *F. glabra*, Decne., states that the tuber is sometimes as much as 2 feet in diameter, and, if as slow-growing as *F. capensis*, this would imply that the plant must attain an age of several centuries. None of the species of *Fockea* appears to be common, and as the tubers are eaten by the natives and do not seem to produce fruit freely, it is possible that they may be approaching extinction.

Two other interesting plants are *Babiana spathacea*, Ker, and *Eriosphara Oculus-cati*, Less., which are exhibited further to illustrate how very rare or very local some of the South African plants are, since neither of these two has been collected by any botanical traveller since Thunberg found them in 1774, until these specimens were gathered. The *Babiana* was originally described as *Gladiolus spathaceus*, Linn. f., Suppl. p. 96, from a specimen collected by Thunberg. The type and the specimen here exhibited are identical with it. An account of the plant will be found in Hooker's 'Icones Plantarum,' vol. xxviii. t. 2710.

The *Eriosphæra* was originally described as *Gnaphalium Oculus-cati*, Linn. f., Suppl. 364, from a specimen collected by Sparrman; a specimen of it in Thunberg's herbarium, upon which Lessing founded the genus *Eriosphæra*, is figured by Harvey in his 'Thesaurus Capensis,' vol. ii. p. 30, t. 149.

A discussion followed. Prof. Poulton, Dr. Rendle, Dr. Stapf (who gave an account of the probable introduction of the photographed specimen to Schönbrunn in 1758), and the Chairman took part. The last referred to the courtesy of the Vienna authorities in lending the only existing herbarium specimens of *Fockea* to Kew for a short time.

The following papers were read and discussed :—

Dr. ALFRED B. RENDLE, M.A., F.L.S., and others.—“ Report on the Botanical Results of the Third Tanganyika Expedition.”

Messrs. W. F. COOPER, F.L.S., and L. E. ROBINSON.—“ A New and Abnormal Species of *Rhipicephalus*.”

January 17th, 1907.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 20th December, 1906, were read and confirmed.

The Rev. Alfred John Campbell, Mr. Walter Henry Young, and Mr. John Clark Newsham were admitted Fellows.

Mr. Charles Edward Fryer was proposed as a Fellow.

Miss Mary Anderson Johnstone, B.Sc.(Lond.), was elected a Fellow.

The President referred to the death of Mr. William Mitten as having caused a vacancy in the list of Associates, to fill which five candidates had been proposed on the 6th December, 1906; on balloting, Mr. WILLIAM HENRY PEARSON was elected an Associate.

The GENERAL SECRETARY drew attention to the copy by Jean Haagen of the portrait of Carl von Linné, by J. H. Scheffel, dated 1739, now preserved in the Linnean Museum at Hammarby, which had been presented to the Society by the University of Upsala. Mr. Carruthers and Dr. Murie having spoken, a special vote of thanks to the University for this most acceptable gift was voted unanimously.

The following papers were read and discussed :—

- W. BOTTING HEMSLEY, F.R.S., F.L.S.—“*Platanthera chlorantha*,
Custor, var. *tricalcarata*.”
The late Mr. C. B. CLARKE, F.R.S., F.L.S.—“*Acanthaceæ* of
insular Malaya.” (Communicated by Dr. OTTO STAFF,
F.L.S.)
Rev. T. R. R. STEBBING, F.R.S., Sec.L.S.—“A Freshwater
Isopod from Calcutta.”
Mr. ALEXANDER PATIENCE.—“On a new British Terrestrial
Isopod.” (Communicated by the Zoological Secretary.)

February 7th, 1907.

Lieut.-Col. PRAIN, C.I.E., F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 17th January, 1907, were read and confirmed.

Mr. Frederick William Cousens and Mr. Gregory Macalister Mathews were proposed as Fellows.

Mr. Arthur William Garrard Bagshawe and Mr. Charles Arnold Newman were elected Fellows.

The Rev. JOHN GERARD, S.J., F.L.S., brought forward “Some Observations on Climbing Plants,” illustrating his remarks by lantern-slides from his own photographs from living plants and herbarium material. He began by pointing out the two opposing methods of describing spiral growth or torsion as viewed from the exterior or from the interior of the spiral, the result being that the “dextrorse” of the first is the “sinistrorse” of the second method. With or against the sun, which applies to the northern hemisphere, is reversed in the southern hemisphere, and for these reasons he preferred to use the terms “clockwise” and “counter-clockwise” (shortened to “counterwise”): the Honeysuckle (*Lonicera Periclymenum*) and the Hop (*Humulus Lupulus*) turning clockwise, and the Convolvulus (*Convolvulus arvensis*) and the Scarlet Runner Bean (*Phaseolus vulgaris*) twining counterwise. He showed the result of some experiments he had made by growing beans (*Vicia Faba*) in opaque cylinders, to discover if possible whether the deviation of the twist were innate, or from the direction of the light, the conclusion being drawn that the plant possessed an inclination resembling the instinct of animals, of proceeding in a given direction, and resented any attempt to force it otherwise. The Author concluded with some observations on the behaviour of tendrils, as those of *Bryonia dioica*, displaying one specimen which had varied the torsion four times, and showed ten turns in one direction against seventeen in the contrary.

The discussion which followed was taken part in by Prof. Dendy, Mr. J. C. Shenstone, the General Secretary, Mr. Clement Reid, Mr. T. A. Sprague, Dr. A. B. Rendle, Mr. A. P. Young, and the Chairman, who confirmed the statement, that in *Dioscorea* the direction of the twist indicated in advance the character of the fruit; whether belonging to the typical group or the section *Helmia*.

Dr. A. B. RENDLE exhibited, on behalf of Mr. W. ROSE SMITH, two volumes of four formed by a German collector, A. Ruperti, of Halle in Westphalia, in 1698-1700. It was pointed out that this method of pasting down plants in a volume was the earlier plan, that of using separate sheets being a much later usage; the question was raised, at what date was the book form practically discontinued?

The General Secretary and Mr. J. Burt-Davy contributed a few remarks on this exhibition.

The following papers were read and discussed:—

Dr. OTTO STAPE, F.L.S.—“New Plants from Malaya.”

Mr. F. CHAPMAN, A.L.S.—“Tertiary Foraminifera of Victoria: The Balcombian Deposits of Port Phillip.”

February 21st, 1907.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 7th February, 1907, were read and confirmed.

Mr. Joseph Jackson Lister, F.R.S., and Mr. John Stanley Gardiner, M.A., were admitted Fellows.

Mr. Harry Howard Bloomer, Mr. Charles John Cowper Mee, and Mr. George Penrose were proposed as Fellows.

Mr. Charles Edward Fryer was elected a Fellow.

The following papers of “The Percy Sladen Trust Expedition to the Indian Ocean in 1905 under Mr. J. Stanley Gardiner” were read:—

Mr. J. STANLEY GARDINER, F.L.S., and Mr. C. FOSTER COOPER.—
“Description of the Expedition.—I. Introduction. II. History and Equipment of the Expedition. III. *Résumé* of the Voyage and Work—Part 1. Colombo to Mauritius.”

The following papers were communicated by Mr. J. Stanley Gardiner, M.A., F.L.S.

Mr. R. C. PUNNETT, M.A.—“Land-Nemertean, with a Note on the Distribution of the Group.”

Mr. L. A. BORRADAILE, M.A.—“Land and Freshwater Crustacea.”

Mr. P. CAMERON.—“Hymenoptera.”

Mr. F. F. LAIDLAW.—“Dragon-Flies.”

M. A. FOREL.—“Fourmis des Seychelles, Amirantes, Farquhar et Chagos.”

Prof. G. H. CARPENTER.—“Pycnogonida.”

Dr. H. F. GADOW, F.R.S., and Mr. J. STANLEY GARDINER, F.L.S.—“Aves.”

March 7th, 1907.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 21st February, 1907, were read and confirmed.

Mr. William Percival Westell and Mr. Rowland Edgar Nicholas were proposed as Fellows.

Mr. Frederick William Cousens and Mr. Gregory Macalister Mathews were elected Fellows.

The Meeting having been declared Special in accordance with the notice previously sent out as required by Bye-Laws, Chap. VIII. Sect. XI., the Fellows present proceeded to vote for a Zoological Secretary in the place of the Rev. Thomas Roscoe Rede Stebbing, resigned.

The Ballot being closed the President appointed Mr. Herbert Druce, Mr. John Hopkinson, and Mr. Henry Groves, Scrutineers; the votes having been cast up, the Scrutineers reported to the President, who thereupon declared that Prof. ARTHUR DENDY had been unanimously elected Zoological Secretary.

The President then moved a vote of thanks to the retiring Secretary, which was spoken to by Mr. Horace W. Monckton, Dr. D. H. Scott, and Mr. B. Daydon Jackson, whereupon the vote was carried by acclamation.

Dr. JAMES MURIE, F.L.S., exhibited a portion of a human skull with a growth of *Sabellaria alveolata* and several hydroids upon it; it had been dredged near the Black Deep in the Thames estuary. The President commented on the exhibit, and Dr. Murie replied.

Messrs. H. & J. GROVES, F.L.S., exhibited a series of specimens of *Nitella ornithopoda*, A. Braun, collected by the Rev. Canon Bullock-Webster. This rare species has only been found in a small district in the West of France, from Angoulême in the north to the south of Arcachon, and doubtfully in one locality in Portugal. The especial interest of the specimens exhibited, which were

collected to the south of Arcachon in March and April 1906, was that they represented gatherings of the plant from very different habitats and showed great variations. The plants collected in shallow ditches were already in full fruit, while those from running water and those from Lake Cazan were quite immature, and so far sterile. Only a few specimens of this species have previously reached England, and the collection exhibited was probably by far the most extensive series of forms yet obtained.

Braun recognised two forms—the more typical one almost resembling in habit some forms of our *N. tenuissima* (this form was called f. *moniliformis* by Prof. Migula), and the other var. *laxa*, which resembles *N. gracilis*. Among the specimens were some from roadside ditches near Arcachon, representing a third and very distinct form; this may be called var. *robusta*. It is 4–5 in. high, very dark green, much more robust than the ordinary form, and with comparatively short ultimate rays to the branchlets, giving it the appearance of *N. mucronata* in miniature.

N. ornithopoda is interesting as representing, in Europe, Braun's section POLYARTHRODACTYLÆ. The headquarters of the species in this section is Australasia, where there are eleven species, two reach north to Japan, and one occurs in India. Two or three are found in South America, and one in North America. Three species occur in Africa, one of which is also recorded by Dr. Nordstedt from Portugal. It is not quite certain that *N. ornithopoda* is distinct from this last.

The following papers were read and discussed :—

Miss N. F. LAYARD, F.L.S.—“On the Ornamentation of the Frog-tadpole.” (Abstract, p. 74.)

Mr. S. B. KEMP, B.A.—“Biscayan Plankton. Part XI. Decapoda.” (Communicated by Dr. G. HERBERT FOWLER, F.L.S.)

Prof. E. B. POULTON, F.R.S., F.L.S.—“On the Colour-changes in South African Chamæleons.”

Mr. G. CLARIDGE DRUCE, F.L.S.—“On the Occurrence of *Spergularia atheniensis* and *Agrostis verticillata* in the Channel Islands.” (Abstract, p. 76.)

March 21st, 1907.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 7th March, 1907, were read and confirmed.

Mr. Richard Elmhirst was proposed as a Fellow.

Miss Mary Anderson Johnstone, Mr. Gregory Macalister Mathews, Prof. Richard Henry Yapp, and Mr. Charles Arnold Newman were admitted.

Mr. Harry Howard Bloomer, Mr. Charles John Cowper Mee, and Mr. George Penrose were elected Fellows.

Mr. W. CARRUTHERS, F.R.S., F.L.S., exhibited on behalf of Mrs. HELEN WARD, of Slough, a series of 19 drawings of Alpine flowers, grouped according to their time of flowering, and intended to illustrate a forthcoming volume.

Mr. J. BURTT-DAVY, F.L.S., showed 50 lantern-slides illustrative of the tree and bush vegetation of the Transvaal; the President, Prof. Weiss, Miss Gibbs, and Mr. Carruthers joined in a discussion, to which Mr. Burt-Davy replied.

The following paper was read and discussed :—

Mr. E. A. NEWELL ABBEY, F.L.S.—“ On the Origin of Angiosperms.”

April 18th, 1907.

Dr. A. SMITH WOODWARD, F.R.S., Vice-President, in the Chair.

The Minutes of the General Meeting of the 21st March, 1907, were read and confirmed.

Mr. William Holmes Burrell, Mr. Robert Patterson, and Mr. Geoffrey Watkin Smith, M.A., were proposed as Fellows.

Mr. Rowland Edgar Nicholas and Mr. William Percival Westell, were elected Fellows.

The following were proposed from the Chair as Auditors for the Society's Accounts for the financial year ending 30th April, and by show of hands were elected :—

For the Council, Dr. Horace T. Brown and Dr. A. B. Rendle.

For the Fellows, Mr. Herbert Druce and Mr. John Hopkinson.

The following proposed new Section of the Bye-Laws was read for the first time from the Chair :—

Chap. II. Section 2 *a*.—A Fellow, not in arrear with his Annual Contribution, may, on giving proof of his age to the satisfaction of the Council, compound for all future Annual Contributions, according to a scale for age. Such scale shall be fixed by the Council, and the Council shall have power to vary it from time to time.

Mr. JAMES SAUNDERS, A.L.S., showed a series of lantern-slides of “ Witches' Brooms,” which he explained are usually caused by

one of three agents—parasitic fungi (*Æcidium* and *Eoascus*), parasitic insects, and gnarling. The illustrations shown were of trees affected by parasitic fungi, the mycelium of which permeates in the woody tissue of the diseased plants. They included Silver Fir, Norway Spruce, Common Elm, Hazel, Hornbeam, Birch, Elder, Hawthorn, and Wild Cherry (*Prunus avium*). The Silver Fir was from Norfolk, but all the others came from South Bedfordshire and North Hertfordshire.

Mr. John Hopkinson, Mr. G. S. Saunders, and Mr. A. O. Walker joined in the discussion which followed.

The following papers were read and discussed :—

Mr. J. C. SHENSTONE, F.L.S.—“On the Ecologic Functions of Stolons and Cleistogamous Flowers.” (Abstract, p. 78.)

Mr. A. O. WALKER, F.L.S.—“The Conservation of existing Species by Constitutional or Physiological Variation.”

Mr. HUGH SCOTT.—“On an Aberrant form of Coccidæ.” (Communicated by J. J. LISTER, F.R.S., F.L.S.)

Prof. W. B. BOTTOMLEY, F.L.S.—“On some Results of Inoculation of Leguminous Plants.”

May 2nd, 1907.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 18th April, 1907, were read and confirmed.

Mr. Harry Howard Bloomer and Dr. Arthur Thomas Masterman were admitted Fellows.

Mr. Illyd Buller Pole Evans, B.A., B.Sc., Mr. Frederick Ambrose Gardiner, and Mr. Frank Campbell McClellan, were proposed as Fellows.

Mr. Richard Elmhirst was elected a Fellow.

Dr. G. HERBERT FOWLER, F.L.S., exhibited a new closing-net, of light but effective construction, for tow-netting. The President, the Rev. T. R. R. Stebbing, and Dr. Murie contributed remarks on the subject.

Prof. E. B. POULTON, F.R.S., F.L.S., exhibited the probate of the Will of Richard Anthony Salisbury (1761-1829), F.L.S., and manuscripts of Dr. W. John Burchell, F.L.S., which had been recently presented to the University of Oxford by Mr. F. A. Burchell, of Rhodes University College, Grahamstown, South Africa.

The GENERAL SECRETARY exhibited, on behalf of the owner, two

portraits of JOHN FRASER, F.L.S., by John Hoppner and Sir George Raeburn; the latter, he pointed out, was the unacknowledged source of the lithographed portrait in Hooker's 'Companion to the Botanical Magazine,' vol. ii. (1836) p. 300. The following note accompanied the exhibit:—

"John Fraser (1750–1811) was born at Tomnacloich, Inverness-shire in 1750, and apparently came to London in 1770, when he married and settled as a hosier and draper at Paradise Row, Chelsea. Having acquired a taste for plants from visiting the Botanical Garden, Chelsea, then under the care of Forsyth, he sailed to Newfoundland in 1780 in search of new species, returning the same year. In 1784 he embarked for Charleston, whence he returned in 1785, only to start again the same year. His third, fourth, and fifth visits to North America were made in 1790, 1791, and 1795, he having in the latter year established a nursery at Sloane Square, Chelsea, to which his discoveries were consigned. Having introduced various American pines, oaks, azaleas, rhododendrons, and magnolias, in 1796 he visited St. Petersburg, where the Empress Catherine purchased a collection of plants from him. Revisiting Russia in 1797 and 1798 he was appointed botanical collector to the Czar Paul, and commissioned by him, returned to America in 1799, taking with him the eldest of his two sons.

"In Cuba he met and was assisted by Humboldt and Boupland. On his return the Czar Alexander declined to recognise his appointment by his predecessor, though Fraser made two journeys to Russia to obtain remuneration.

"In 1806 he started on his seventh and last visit to America, again taking his son; he returned with many new plants, in 1810, to his nursery, which however was never successful."

He died at Sloane Square on 26th April, 1811. Walter's herbarium, which he possessed, was presented in 1849 to the Linnean Society, of which he was a Fellow, by his son; but was disposed of in 1863.

The following papers were read and discussed:—

Mr. A. D. DARBISHIRE.—"On the Respiratory Mechanism in certain Elasmobranchs." (Communicated by Prof. A. DENDY, Sec.L.S.)

Prof. E. B. POULTON, F.R.S., F.L.S.—"On the Fauna and Flora of Abyssinia as compared with that of West Africa."

Herr C. J. WITB.—"Pseudoscorpions." (Communicated by the Rev. T. R. R. STEBBING, F.R.S., F.L.S.)

The PRESIDENT then laid before the Society four papers of a proposed series on the Fauna of the Sudanese Red Sea; they consisted of (1) An Introduction, by the President; (2) a narrative of Mr. Cyril Crossland's explorations; (3) Mr. Crossland's account of the formation of certain shore-cliffs in Egypt, and (4) of the Red Sea Coral Reefs; with (5) Mr. E. R. Sykes's enumeration of the Polyplacophora collected.

May 24th, 1907.

Anniversary Meeting.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 2nd May, 1907, were read and confirmed.

The Duke of Bedford and Mr. Charles Edward Fryer were admitted Fellows.

Mr. Ralph Sneyd Pearson was proposed as a Fellow.

The President read from the Chair the proposed new subsection of the Bye-Laws.

The Treasurer then laid the Annual Cash Statement (p. 17), which had been duly audited, before the Fellows; he pointed out that the Society's investment in Consols had been sold, and reinvested in other securities returning a higher dividend.

The Treasurer's report was received and adopted.

The General Secretary's Report of deaths, withdrawals, and elections during the past year was read, as follows:—

Since the last Anniversary Meeting 13 Fellows have died or their deaths been ascertained:

Major R. Cary Barnard.
Mr. Charles William Agnew
Bruce.
Sir Walter Lawry Buller.
Mr. Edward Chapman.
Mr. Charles Baron Clarke.
Dr. S. M. Curl.

Sir Michael Foster.
Prof. William Fream.
Sir Thomas Hanbury.
Mr. George Darby Haviland.
Mr. Frederick Justen.
Prof. Harry Marshall Ward.
Mr. William Waterfield.

ASSOCIATE (1).

Mr. William Mitten.

FOREIGN MEMBER (1).

Prof. Frans Reinhold Kjellman.

The following 9 Fellows have withdrawn:

Lieut.-Col. Alfred William
Alcock.
Mr. Herbert Goss.
Mr. Frederick William Hildyard.
Mr. Charles Holme.

Mr. Richmond William Hullett.
Rev. Andrew Bayne Morris.
Major B. G. Wardlaw Ramsay.
Mr. J. Brooking Rowe.
Mr. Harold Stuart Thompson.

Receipts and Payments of the Linnean Society from May 1st, 1906, to April 30th, 1907.

<i>Receipts.</i>		£	s.	d.
Balance at Bankers on the 1st May, 1906	.....	361	3	4
Interest on Investments	.....	212	19	9
Admission Fees	.....	180	0	0
Annual Contributions	.....	1548	5	0
Compositions	.....	—	—	—
Sales of Publications:—				
Transactions	.....	£69	3	8
Journals	.....	69	14	1
Proceedings and Catalogues	.....	2	2	3
Miscellaneous Receipts	.....	131	0	0
Sale of Consols	.....	105	8	11
" " Westwood Bequest	.....	3855	1	5
		219	4	8

£6613 3 1

Investments on April 30th, 1907.

Metropolitan 3½ per cent.	.....
Great Indian Peninsula Railway, Annuity Class B	.....
North Bridge Railway 4 per cent. Stock	.....
Metropolitan 3 per cent.	.....
India 3 per cent.	.....
Eastern Bengal Railway 4 per cent. Debenture Stock	.....
Great Western Railway 4 per cent.	.....
Metropolitan Water Board 3 per cent. Stock "B" (Westwood Bequest)	.....

Payments.

Taxes and Insurance	.....	£	s.	d.
Repairs and Furniture	.....	10	18	9
Coal and Gas	.....	56	4	2
Salaries	.....	44	3	8
Library:—		798	11	8
Books	.....	£222	9	10
Binding	.....	91	14	5
		314	4	3

Expenses of Publications:—

Printing	.....	£391	18	4
Illustrations	.....	211	14	8
Distribution	.....	29	5	0

Miscellaneous Printing and Stationery	.....	632	18	0
Petty Expenses (including Tea and Postage)	.....	85	4	10
Re-investment of Cash realised by Sale of Consols	.....	122	5	0
Investment on April 20th, 1907	.....	4074	6	1
Balance at Bankers, 30th April, 1907	.....	30	17	10
		443	8	10

£6613 3 1

HORACE W. MONCKTON, *Treasurer.*

£6362 9 3

We have (in conjunction with the Professional Auditor, who certifies as to all details) audited the Accounts of the Society for the year ended 30th April, 1907, and found them correct.

ALFRED B. RENDLE,
HORACE T. BROWN,
HERBERT DRUCE,

B. DAYDON JACKSON,
JOHN HOPKINSON,
Auditors.

W. B. KEEN, *Chartered Accountant.*

Mr. Harry Edward Heath Smedley has been removed from the List of Fellows, under the provisions of the Bye-Laws, Chapter II., Section 6.

Thirty-two Fellows have been elected (of whom 30 have qualified), and one Associate.

The Librarian's report was then laid before the Meeting as follows :—

During the past year, 85 Volumes and 135 Pamphlets have been received as Donations from Private Individuals.

From the various Universities, Academies, and Scientific Societies 287 volumes and 64 detached parts have been received in exchange and otherwise, besides 60 volumes and 20 parts obtained by exchange and as Donations from the Editors and Proprietors of independent Periodicals.

The Council have sanctioned the purchase of 186 volumes and 98 parts of important works.

The total additions to the Library are therefore 618 volumes and 317 pamphlets and separate parts.

The number of Books bound during the year is as follows :—

In full morocco 5 volumes, in half-morocco 210 volumes, in half-calf 4 volumes, in full cloth 236 volumes, in vellum 53 volumes, in buckram 28 volumes, in boards or half-cloth 21 volumes. Relabelled (half-morocco and cloth backs) 62 volumes. Total 619 volumes.

The Secretary, Dr. D. H. SCOTT, then read the Bye-Laws governing the elections of the Council and Officers, consisting of Chap. VIII. Sect. 4-8 inclusive.

The President then opened the business of the day, and the Fellows present proceeded to vote.

The President then delivered his Annual Address as follows :—

PRESIDENTIAL ADDRESS.

FELLOWS OF THE LINNEAN SOCIETY,—

At the conclusion of my third year of office I thank you again for the opportunity you have given me of serving our Society, and I ask you to join me in thanking my fellow-officers who have taken their full share of the responsibility and the work.

To the regret of us all, our honoured Zoological Secretary, the Rev. T. R. R. Stebbing, F.R.S., whose reputation as an original worker in Carcinology gave distinction to the office, intimated his intention of retiring during the present Session. We did what seemed possible to induce our colleague to remain in office at least until this anniversary meeting, but the claims of much unfinished work elsewhere weighed too heavily, and the Council after due consideration felt bound to respect Mr. Stebbing's undoubted wish, and to release him from duty. I am sure that I only express the opinion of all the Fellows when I say that Mr. Stebbing carries with him on retiring our most cordial thanks for his devotion to our affairs during the last four Sessions, our appreciation of his work, both on Council and at the meetings, and our earnest hope that he may long have health and strength to continue those admirable researches which have added so much to our knowledge of systematic Invertebrate Zoology. Our personal loss, in this instance, is, it may be confidently expected, a gain to Science at large.

The Society is fortunate in having found Prof. Arthur Dendy able and willing to accept office and take up at short notice the duties relinquished by Mr. Stebbing; and, at our special meeting on March 7th, on the nomination of the Council, he was duly elected Zoological Secretary. As Prof. Dendy was already a Councillor his nomination and election to office created no vacancy, and consequently Mr. Stebbing was enabled to retain for the remainder of the Session his seat upon our Council.

We have enjoyed a normal, active and useful Session. Anyone attending the meetings with some regularity, or looking over the series of fortnightly abstract reports which are circulated to the Fellows and afterwards printed in the 'Proceedings,' will agree that we have received and discussed a number of very varied and interesting communications, ranging over most departments of Botany and Zoology. Amongst noteworthy papers may be mentioned Dr. Herbert Fowler's series on Biscayan Plankton, Mr. Stanley Gardiner's on the Results of the first Percy-Sladen Trust Expedition to the Indian Ocean, and Mr. Crossland's on the Sudanese Red Sea Fauna; an important work by our late Fellow, Mr. C. B. Clarke, on Malayan Acanthaceæ; the paper on the Fauna and Flora of Abyssinia and West Africa, by Prof. Poulton;

and that on the Origin of Angiosperms, by Messrs. Newell Arber and J. Parkin, which gave rise to an excellent discussion.

The number of new Fellows we have elected this Session, 32, is unusually large, and includes active workers in both sides of our Science—whose closer co-operation we value.

The death of Mr. William Mitten, A.L.S., the well-known Bryologist, left a vacancy which the Society filled up on January 17th by electing Mr. W. H. Pearson as an Associate. Any Fellow examining the claims of the five men who were proposed on that occasion, could not fail to be struck by the high order of merit they all presented. It is a matter of congratulation that our Associateship is so highly prized by recognised workers in Science; but still I think many of us felt some regret that we could give the honour to one only of five such excellent candidates, all of whom were well-qualified and worthy.

The death of our Foreign Member Professor Frans Reinhold Kjellman, the successor of Linnæus as occupant of the Chair of Botany at Upsala, was especially startling, occurring as it did only a few weeks previous to the great Linnean celebrations at his University. The vacancy thus created in our list has not yet been filled, but the matter will shortly come up before the Council for consideration. Our losses in ordinary Fellows, thirteen in all, have not been numerous this Session, but they include some notable figures—both veterans of Science, such as Sir Michael Foster and Mr. C. B. Clarke, and also younger men of high distinction, such as Prof. Marshall Ward, by whose work and counsel we might naturally have expected to profit for many years to come. Mr. Clarke served the Society as President from 1894 to 1896, and he was a member of Council and a Vice-President up to within a few months of his death. The obituary notices of the deceased Fellows will be laid upon the table by the Secretaries as usual.

The Council has awarded the Linnean Medal this year to the distinguished Botanist Dr. Melchior Treub, for many years Director of the State Botanic Gardens at Buitenzorg in Java, and in regard to whose services to Science I shall have something to say at a later stage in these proceedings.

Our arrangements for publishing the scientific results of the first Percy-Sladen Trust Expedition were alluded to in my last Address, and you may now be interested to hear of the progress of that undertaking. The first seven of the reports were laid before the Society on February 21st along with the first half of the Introduction, including the Narrative of the Expedition from Ceylon to Mauritius by Mr. Stanley Gardiner and Mr. Forster Cooper. The second half (Mauritius to Seychelles) is now nearly completed, and five additional reports, dealing with Lithothamnia, Ticks, Fishes, Stomatopoda, and Nudibranchiata, are already in our Secretary's hands. That on the Fishes includes an account of 185 species, of which 51 are new, requiring 8 new genera. Most of the above-mentioned sections of the

report are by this time in the press, and Fellows may reasonably expect to receive a first instalment of this special publication in our series of 'Transactions' before very long.

This is a notable Session, and to-day is a notable date in the annals of our own and all similar Societies. At this meeting we celebrate the 200th Anniversary of the birth of our eponymous hero, the illustrious Swedish Naturalist Carl von Linné; and at this time the eyes of Linneans all the world over will naturally turn to Upsala, where the ancient University celebrates, yesterday and to-day, with fitting pomp and circumstance, an occasion with which we desire to express our most cordial sympathy and congratulations. This Society was officially invited to appoint a delegate to take part in the proceedings as a guest of the University, and our Council expressed the wish that if the President of the Society was unable to go to Sweden himself at this time, he should name a representative to take his place. Our present Anniversary Meeting and other duties in England prevented me from having the honour of representing the Society, and I had great pleasure in proposing to the Council the nomination of our Past-President, Mr. William Carruthers, F.R.S., whose well-known and long-continued studies on the history, work, and personal relics of Linnæus rendered him a most suitable representative on the occasion.

Mr. Carruthers, accompanied by our General Secretary, is now in Sweden, conveying both to Upsala and to Stockholm our messages of goodwill and congratulation; and bearing for presentation to the University of Linnæus a special copy of our Linnean Medal. We shall hope to hear from our representative, at a future meeting, some account of the proceedings at this historic gathering in Sweden; and I would now propose to you that, if you are agreeable, we should participate so far as we can in those proceedings by sending, at the conclusion of this meeting, to the Rector of the University of Upsala, a telegram of congratulation in the following terms:—

*Linnean Society of London assembled at Anniversary
Meeting congratulates University of Upsala on historic
Linnean Celebration.*

Our Council has decided that, in addition to the recognition of the occasion at the present meeting, our own rejoicing on this 200th Anniversary should take the form of a *Conversazione*, in these rooms, which we hope the Fellows and their friends and a few other representative men of Science will be pleased to attend. The date fixed is June 7th; the invitations, as you are aware, have been issued, and we only regret that limitations of space prevent us from receiving a wider circle of scientific friends in this house. We expect on the occasion to have displayed in the Library and Council-room upstairs some exhibits of scientific interest and

novelty, while in this meeting-room there will be, during the course of the evening, a few brief illustrated lectorettes or demonstrations by Fellows of the Society.

In my two previous Addresses I have dealt with the application of biological knowledge, from the time of Linnaeus onwards, to an economic problem of considerable importance—the production naturally and artificially of precious pearls in shell-fish. It may interest you to know that since I last spoke to you on the subject, another highly successful fishery has been held on the Ceylon pearl-banks, resulting in the capture of twenty-one millions of Oysters which have sold for £70,000. After a barren period of twelve years, during which these banks produced nothing, we have had since 1902 a series of five most successful seasons—the most profitable pearl-fisheries that, so far as is known, have ever been held—yielding in all to their fortunate possessors nearly half a million sterling, besides much benefit both direct and indirect to the native populations of India and Ceylon. The Government has taken what is probably, under all the circumstances, a very wise step in leasing the fisheries for a period of years at a fair rent on well-considered conditions of tenure. The banks are now being carefully cultivated, under scientific direction, and may confidently be expected, when they pass back into the hands of the Government at the conclusion of the lease, to prove even a more valuable property than they are at present.

This is an example taken from one little corner of the vast field of useful work in Applied Science open to the modern biologist. I desire on the present occasion to deal briefly with a wider question of far greater importance from both the scientific and the administrative or economic points of view,—viz., the scientific investigation of the oceans of the world, and primarily of our own British coasts, in the interests of the sea-fisheries and other allied industries. The more enlightened of our administrators, as well as scientific men generally, are now becoming convinced of the necessity of studying the forces and resources of Nature as a means of subjugating the world to the human mind. The future undoubtedly belongs to that nation or race which comes to understand best the working of nature, and which can most skilfully and economically apply that knowledge to the welfare of man.

Biology has been later than some of the inorganic sciences in entering this field of practical applications to industry, and as yet it has not been utilised to the same extent as, for example, Chemistry or Electricity. But the extension and recognition of the practical utility of our Science has of late been increasing by leaps and bounds, and the outlook at present is most promising. I need scarcely delay to remind you that Bacteriology and a great part of modern Medicine and Surgery are essentially applications of Biology. Cold storage, the canning trades, and many other industries and processes are based upon biological principles.

Even apart from questions of food-supply and public health, there are wide applications both in the trades and in the arts. Many industrial products of the sea of great value to man, such as the pearl, the coral and the sponge fisheries of the world, are wholly biological concerns susceptible of scientific treatment. The Japanese have recently started an important coral fishery—a fishery for the precious coral—on their southern coasts, where it is now a growing industry. And the first thing they did was to appoint two scientific men, well-known zoologists (Kishinouye and Kitahara), to investigate thoroughly the animals concerned and the conditions under which they live, in order, to quote the words of the Japanese report, to “prevent exhaustion and make it an endless source of profit.” That is the action that an enlightened Government in a country of advanced civilisation will naturally take.

Japan has an efficient Imperial Bureau of Fisheries and employs many scientific men. The United States similarly has a powerful Bureau of Fisheries, formerly the famous “Commission of Fish and Fisheries.” Germany and other European countries have also well-equipped departments and institutions for fisheries research supported by the State. That being so, it is an extraordinary circumstance, and difficult to realise, that our own powerful and wealthy country, having perhaps a greater stake in the harvest of the sea than any other nation, has no adequate, scientifically equipped department prepared to deal comprehensively with sea-fisheries problems. Our Government department of Fisheries, once at the Board of Trade, now a constituent part of the Board of Agriculture and Fisheries, is admittedly not organised and not equipped and not provided with the material resources to undertake the necessary marine investigations.

The Sea-Fisheries authorities around the coast, upon whom devolves the administration and promotion of the local fisheries, are subject in their actions to the supervision of the Central Government, but are not provided with any funds from the Treasury. It has been left to a few sea-coast Universities and Marine Laboratories (St. Andrews, Plymouth, Cullercoats, Liverpool) to conduct investigations on their own initiative and, in the main, at their own expense. Recently, an International scheme for the Exploration of the North Sea and adjoining waters has been conducted jointly by our own and other neighbouring Governments as a temporary agreement.

As the period of five years for which this international engagement was made ends in July, and as the question whether such international work or a proposed national scheme of sea-fisheries research will best suit the needs of this country is to be made the subject of a Government enquiry, the present seems a fitting time for scientific men who are interested in fishery questions to look somewhat critically into the work that is being done, and determine if possible how far the methods employed are adequate and are calculated to yield reliable results.

Five years ago, in 1901-02, an "Ichthyological Research Committee," after sitting at the Board of Trade for nearly a year, taking evidence and discussing results, issued a report which has probably met with the fate of many Government publications when, decently shrouded in blue covers, they are laid to rest on shelves and buried in dust. In that forgotten report a plan of organisation of fishery research is outlined which, with modifications and elaborations, might be suitable for adoption at the present juncture. For I believe it will be pretty generally agreed in this country that the time has now come when the International scheme, having run for the five years of its appointment, has served its purpose, and may with advantage give place in England to a National scheme somewhat on the lines of that put forward in 1902. Much has, however, happened in the last five years, many opinions on fishery matters have been expressed, and it may well be that some points in that scheme can now be improved, and that some new details should be added.

So many of our fisheries experts in England, Scotland, and Ireland are, from their official connections or as a consequence of holding salaried posts, prevented from expressing a public opinion, that it may be useful if one who is a free-lance with no official position, no emoluments and no responsibilities that tie his hands or tongue, puts forth at this time, not as a member or representative of any Council or Committee, but simply and solely on his own responsibility, a scheme which may possibly find acceptance by the various bodies concerned, and in any case will serve as a basis for discussion.

The first proposition I would lay down is that *sea-fisheries investigation is work that ought to be undertaken, directed, and subsidised by the Government*. If the nation accepts responsibility for the Ordnance Survey, for the Geological Survey, and for Agricultural enquiries, it is difficult to see on what grounds the closely related biological survey of our territorial waters can be repudiated. The scheme then ought to be a National one, and the Government Department—possibly changed, possibly enlarged, possibly under new auspices—but still a *Government Department of Fisheries, must be regarded as the responsible centre or head*.

My second proposition is that, as a result of past history, there are now a number of more or less independent organisations carrying on useful work on different parts of the coast more or less uncontrolled and unsupported by the Government; and it is clear that *all these energies ought to be utilised and co-ordinated*. The Sea-Fisheries Committees of England and Wales, the Marine Biological Association, the Liverpool Marine Biology Committee, the Fishmongers' Company, and the National Sea-Fisheries Protection Association ought to be brought together around the Government Department in such a way that without losing their identity or independence their sea-fisheries work may be done in consultation, under control and at the expense of the State. Various University and marine laboratories—such as Plymouth,

Lowestoft, Port Erin, Liverpool, Cullercoats, and possibly others—should be utilised either wholly or in part, either continuously or from time to time as may be found necessary. The men and the materials, the organisations and the institutions, are all in existence, they only require to be co-ordinated and subsidised to constitute an efficient National scheme embracing all parts of the coast.

How, then, are they to be co-ordinated? These various bodies are so independent and well-established that *the only possible basis of co-ordination is adequate representation on the controlling board.* The Ichthyological Research Committee recommended the formation of a representative "Fishery Council for England," and after five years' further discussion of the matter I am still of opinion that such a body is the only possible solution of the problem. The head officials of the Government Department would form a nucleus round which would be grouped representatives of marine laboratories and coastal authorities, meeting periodically at headquarters for consultation as to the allotment of subsidies, the delegation and subdivision of work, the co-ordination of observations, and the formulation of results. I would submit that it is eminently desirable that membership of this Fishery Council should be *Honorary*, and that no member should himself receive salary or grant for work done under the auspices of the Council. Members of such a Council must be absolutely independent and should have no vested interests.

Some other details which may still be applicable will be found in the blue-book I have referred to, many other points will no doubt have to be arranged by an organising Committee of experts, but I feel confident that it is only some such scheme as this that will unite our independent authorities, satisfy conflicting interests, and end the present state of chaos.

In addition to the organisation of Sea-Fisheries research there is, however, the still more fundamental question as to agreement in the methods of investigation; and I have recently become deeply impressed with the necessity of *investigating our methods* before we investigate nature. At the time of the Ichthyological Research Committee and the commencement of the International North Sea work, I was one of those who held that the proposed observations were far too distant in time and space to yield reliable conclusions; and I think it may be claimed that the course of events since, and the differences of opinion now existing amongst experts as to the value of the results obtained, have justified our opinion. Before taking gatherings of marine organisms almost haphazard, and then proceeding to regard them as samples of large areas, we must find out what our gatherings really represent and what relation they bear to fair "samples," also how these samples vary with changes in time, place, wind, depth, and other conditions—and all this can only be determined, I believe, by the intensive study of very limited areas under various conditions.

I have published elsewhere* during the last year some observations that confirm me in the belief that the plankton in the ocean, which is directly or indirectly the food of fishes, has no such uniformity of distribution as is sometimes supposed. If, then, this uniformity does not exist over wide areas, how can we pretend to investigate such an enormous region as the North Sea by means of comparatively few and distant observations? We must, in my opinion, learn the meaning and value of our work by the intensive study of areas such as the Firth of Forth, Kiel Bay, Plymouth Sound, or Liverpool Bay, before attempting the English Channel, the Irish Sea, or the Clyde Sea-area, and these again before tackling the relatively enormous North Sea, which is at least twenty times the size of the Irish Sea.

Convinced of the fundamental importance of such work, I spent the greater part of the last summer vacation in experimenting day after day with various plankton nets under similar and under varying conditions in a limited sea-area off Port Erin in the Isle of Man—with results that were startling in their diversity. It was obvious that the plankton was at that time very unequally distributed over the depths, the localities, and the dates. It seemed clear that one net might encounter a swarm of some organism which a neighbouring net escaped, and that a sample taken on one day might be very different in quantity from a sample taken under the same conditions next day.

I stopped this series of observations on September 17th. After a few days of wind a spell of quiet, calm weather followed, during which I took some tow-nettings both inside Port Erin Bay and outside, both in the day and at night, and all of these differed entirely in character from the gatherings of the previous weeks—being composed mainly of *Chaetoceros* and other Diatoms. During this period of calms and light easterly winds the surface of the sea was smooth and the water was distinctly coloured by the abundance of Diatoms. When the weather broke again, at the end of September, another abrupt change took place, and gatherings taken at the beginning of October showed very few Diatoms but many Copepoda. It is evident that if any observer had been taking quarterly or even monthly samples of the plankton in that sea-area, he would have obtained very different results, according to the exact date of his visit. On three successive weeks about the end of September he might have found evidence for as many different far-reaching views as to the composition of the plankton in that part of the Irish Sea. How it can be supposed that hauls taken miles apart and repeated only at intervals of months, or even weeks, can give any sure foundation for calculations as to the population of wide sea areas, I fail to see.

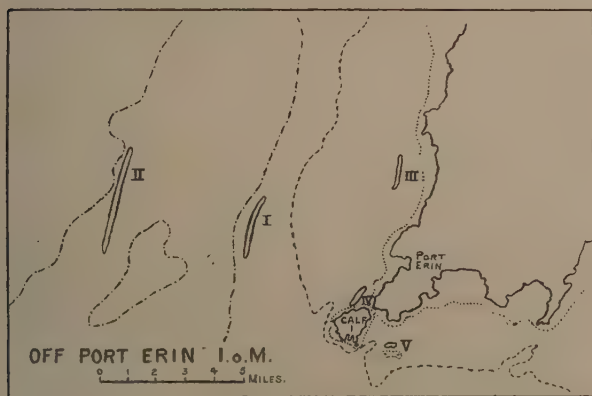
These conclusions need not lead us to be discouraged as to the ultimate success of scientific methods in solving what may be called world-wide problems, but they suggest that it might be

* Trans. Biol. Soc. Liverpool, vol. xxi. p. 1.

wise to secure by detailed local work a firm foundation upon which to build, and to ascertain more accurately the representative value of our samples before we base conclusions upon them.

I do not doubt that in limited, circumscribed areas of water, in the case of organisms that reproduce with great rapidity, the plankton becomes more uniformly distributed, and a comparatively small number of samples may then be fairly representative of the whole. That is probably more or less the case with fresh-water lakes; and I have noticed it in Port Erin Bay in the case of Diatoms. In spring, and again in autumn, when suitable weather occurs, as it did last year at the end of September, the Diatoms may increase enormously, and under such circumstances they seem to be very evenly spread over all parts and to pervade the water at all depths; but that is emphatically *not* the case with the Copepoda and other constituents of the plankton, and it was not the case even with the Diatoms during the present spring.

With the view of testing plankton methods still further, at another time of year, I devoted a month this spring (March 28th to April 27th) to a systematic exploration, from the S.Y. 'Lady-bird,' of the sea off Port Erin at the south-west corner of the Isle of Man. The region in which I worked measured (see map)



10 miles from east to west (out to sea) and rather less from north to south (along the coast), but the area investigated was really much more limited than these numbers indicate, since the samples were taken from only two "off-shore" stations, one 5 miles (I.) and the other 10 miles (II.) out from Bradda Head; and from three "along-shore" stations, one to the north (III.) towards Niarbyl, one to the south (IV.) towards the Calf Island, and one in the "southern sea" (V.) off Spanish Head—all in water of much the same depth, about 20 fathoms.

Whilst I was taking these samples in the open sea, almost daily, from the yacht, Mr. Douglas Laurie, with a crew of students from the Biological Station, simultaneously took similar samples inside Port Erin bay in comparatively sheltered water. In 23 working days I find that we took in all 276 samples, an average of 12 per day. It will be readily understood by anyone who has carried on such work continuously, with varied weather, that it was a busy time; and that on some days we were fairly wet, without any time to get cold, from morning till night. So much practical work could only be carried on with the willing help of several assistants. All on board the yacht helped in various ways, but I must thank especially Mr. Buchanan-Wollaston who assisted me in working the nets, Mr. Chadwick who preserved most of the material in the laboratory at the end of each day's work, and Mr. Andrew Scott, A.L.S., who has systematically examined the samples for me. A detailed account of these gatherings will appear elsewhere; I propose at present to discuss only some of the more obvious features of the series—partly from my own records made at the time of collection and partly from Mr. Scott's notes.

At each station, after taking the bearings and the depth, we first lowered two vertical nets, the Petersen-Hensen and the Nansen, to a depth of 20 fathoms, pulled them up slowly through 10 fathoms, and then closed them by "messengers" run down the line. This gave us samples, taken vertically with these two very different nets, of the organisms present in the water between 10 and 20 fathoms. After that three ordinary horizontal open tow-nets exactly alike in all respects (size, shape, mesh, age) were put over—one (A) with a weight attached was allowed to sink to a depth of about 10 fathoms, from which it gradually rose as the ship went slowly ahead; while the other two (B and C), unweighted, remained continuously at or just under the surface and worked side by side, like a pair of sharks or porpoises swimming in our wake. These last two nets ought, if there is any uniformity whatever in the plankton even in the most limited areas, to give similar results, and of course they did so in most cases. My purpose in taking the two similar surface nettings side by side was to show this, and also to test the reliability of the sample; for I would only consider it a trustworthy sample when these two nets agreed in their evidence. Where, under the circumstances stated above, the gatherings differed notably, there must have been some accident in the working of the nets or some abnormality in the distribution of the plankton, such as, no doubt, will sometimes be encountered when traversing the edge of a swarm of gregarious organisms; and it is important to get some evidence as to how frequently such accidents or abnormalities may be met with. For example, on April 2nd, at Station III., I find that the two surface-nets used together gave 17 c.c. and 42.5 c.c. of material respectively; on April 9th, at Station I., 2.5 and 8 c.c. respectively; and on April 24th, at Station II., they gave 7 c.c. and 15 c.c.

respectively. On most occasions of course they were very similar and on some absolutely identical in their catch.

The net A (which may be called the weight-net) is of use as having traversed a wider range, 0 to 10 fathoms, so as to sample all the water above the zone traversed by the vertical nets, and it frequently, and in fact usually, obtained a larger gathering and showed a greater variety of organisms than either the bottom (vertical) or the surface nets.

On some occasions, at the "along-shore" stations (*e. g.*, 2 miles off Bradda Head) hauls were taken with a new "shear-net" made on the principle of the Heligoland "Scherbrutnetz" (*Conseil International—Rapports et Procès-verb.*, vol. ii, p. 62, 1904). This was used as a mid-water net—being lowered to a depth of 5 to 10 fathoms, where, through the action of the shearing plate, placed like a vertical otter-board, it remained even when the ship went ahead at a moderate speed, and so formed a most efficient instrument of capture in waters where the ordinary net cannot be towed. The mouth measured 9 feet in circumference, the net was over 10 feet in length, and being formed of rather coarse mesh caught large quantities of the larger organisms of the plankton such as *Sagitta*, *Medusæ*, *Ctenophora*, *Zoëas*, the larger Copepoda and some young fishes.

As a vertical closing net I greatly prefer the Nansen to the Petersen-Hensen. It is lighter and less complicated (a matter of some importance in a rough sea), more easily manipulated, less liable to failure in action, costs less and seems to catch more for its size of opening.

The localities to be sampled, all within a ten-mile radius of Port Erin, were—the two "off-shore" stations, No. I., 5 miles, and No. II., 10 miles, from Bradda Head respectively, and three "along-shore" stations, No. III. towards Niarbyl, No. IV. towards the Calf Island, and No. V. off Spanish Head. The nets to be compared were:—two vertical deep-water, the Nansen and the Petersen-Hensen, and three horizontal, one weighted and the other two surface. In addition a shear-net gathering was taken on occasions from intermediate waters. Each haul was a 15 minutes one.

I shall append (pp. 32–33), in tabular form, my first statement of results, which may require to be modified in detail or supplemented later on, but which may be taken as substantially correct. Whether one looks at the hauls with the same net at the one locality on different days, or at neighbouring localities on the same day, the want of uniformity both in quantity and in quality is striking. The range for all nets is from 0.5 c.c. to 164 c.c., and it is the same for the Nansen; for the Petersen-Hensen it is from 0.5 to 64.5 c.c., for the weighted open net from 5.5 to 41 c.c., for the surface nets from 1 c.c. to 42.5 c.c., and for the shear-net from 11 to 78.5 c.c.

One or two broad features of the collection are obvious. In the earlier part of the time, up to about the middle of April, Diatoms

were abundant, and nearly all the gatherings had a greenish tinge. During that period the plants were more abundant in the bottom waters, and the animals at the surface.

Day after day we found that the two closing vertical nets hauled up from 20 to 10 fathoms were of a brownish-green colour and contained (especially the Nansen) an abundant gathering of Diatoms. The surface nets during this time contained more Copepoda. On April 15th and 19th, however, when the change in plankton was taking place, the Diatoms were found to be mainly on the surface and the Copepoda below. As an example of wide distribution I may cite April 10th, when the nets gave consistent results all the afternoon at three localities north of Port Erin, the Diatoms being in all cases more abundant at the bottom and the Copepoda on the surface.

We were fortunate enough on one occasion to obtain incontrovertible evidence of the sharply defined nature of a shoal of organisms, forming an instructive example of how nets hauled under similar circumstances a short distance apart may give very different results. On the evening of April 1st, at the "alongshore" station III., north of Port Erin, off the "Cronk" one mile out, I took 6 simultaneous gatherings in both surface and deeper waters. Two of the nets were the exactly similar surface townets which I have called B and C. At half-time, as the result of a sudden thought I hauled in B, emptied the contents into a jar, and promptly put the net out again. This half gathering was of very ordinary character, containing a few Copepoda, some Diatoms and some larvæ, but *no Crab Zoëas*. At the end of the 15 minutes, when all the nets were hauled on board, all the gatherings, including B, showed an extraordinary number of Crab Zoëas rendering the ends of the nets quite dark in colour. B was practically the same as C, although B had only been fishing for 7 minutes. It was evident that at about half-time the nets had encountered a remarkable swarm of organisms which had multiplied several times the bulk of the catch and had introduced a new animal in enormous numbers. Had it not been for the chance observation of the contents of B at half-time, it would naturally have been supposed that, as all the nets agreed in their evidence, the catches were fair samples of what the water contained over at least the area traversed—whereas we now know that the Zoëas were confined to, at most, the latter half of the traverse and may have been even more restricted. Under these circumstances, an observation made solely in the water traversed during the first 7 minutes would have given a very different result from that actually obtained; or, to put it another way, had two expeditions taken samples that evening at what might well be considered as the same station, but a few hundred yards apart, they might have arrived at very different conclusions as to the constitution of the plankton in that part of the ocean.

The bearing of such observations as these upon some recent

speculations as to the fish-population of the sea, and even as to the amounts of food-matters present in the waters of large areas, is obvious. Nothing in the economics of the sea could be more important than such speculations in regard to what I have proposed should be called the "hylokinesis" * of the ocean, if we could be certain that our conclusions are correct, or even that they are reasonably close approximations.

It is possible to obtain a great deal of interesting information in regard to the hylokinesis of the sea without attempting a numerical accuracy which is not yet attainable. The details of measurement of catches and of computation of organisms become useless and the exact figures are non-significant, if the hauls from which they are derived are not really comparable with one another and the samples obtained are not adequately representative of nature. If the stations are so far apart and the dates are so distant that the samples represent little more than themselves, if the observations are liable to be affected by any accidental factor which does not apply to the entire area, then the results may be so erroneous as to be useless—or worse than useless, since they may lead to deceptive conclusions.

If the biologist then has great opportunities in the application of his science to important human industries, he has also grave responsibilities.

In pure science, erroneous conclusions are of comparatively little moment. They are evanescent, and it has been argued that they may even be useful in stimulating further research which will inevitably lead to their overthrow. Charles Darwin has said of false views they "do little harm, for everyone takes a salutary pleasure in proving their falseness; and when this is done, one path towards error is closed, and the road to truth is often at the same time opened." †

But I would submit that it is very different in the case of conclusions that may be applied to industries. In such cases we have no certainty that the conclusions will be received with scientific caution and made the subject of further investigation. They may be taken blindly and may be applied wrongly without being exposed to scientific criticism. It is necessary then for the scientific man who deals in practical applications to be doubly careful. Much may depend upon the results of his work. Private enterprise, public opinion, local regulations, and even imperial legislation may all be affected by his decisions. He must not lightly come to conclusions upon weighty matters. Of all the varied lines of research in modern biology, none present problems more intricate than some of those connected with our fisheries—none are more interesting and none more important in their bearing upon the welfare of mankind.

* In place of "metabolism" which is an inappropriate term (see Trans. Biol. Soc. Liverpool, vol. xxi. p. 19).

† 'Descent of Man,' 2nd edit. 1882, p. 606.

GENERAL RESULTS OF THE FIVE NETS AT FIVE STATIONS IN THE NEIGHBOURHOOD OF PORT ERIN, EASTER 1907 (Shear-net omitted).
A. Algae; BN. Balanus Nauplei; C. Copepoda; CN. Copepod Nauplei; D. Diatoms; F.e. Fish eggs; M. Medusae;
N. Nauplei; L. Larval Decapods; O. Oikopleura; B.O. Balanus, Cypris stage; Z. Crab zoëas

DATE.	LOCALITY.	PETERSEN-HENSEN.			NANSEN.			WEIGHT-NET.			TWO SURFACE NETS.		
		C.c.	Chief Organisms.	C.c.	Chief Organisms.	C.c.	Chief Organisms.	C.c.	Chief Organisms.	C.c.	Chief Organisms.		
Mar. 29.	Stat. IV.	.....	.....	.....	.....	.....	.....	.....	.....	8+9	D. C. F.e.		
Apr., 1.	Stat. III.	19	D.	18	D. CN.	16	D. A.	17	D. A.	8+25	C. A. Z.		
"	Stat. III.	23	D.	41	D. N.	.....	.....	.....	.....	17+42.5	D. A.		
"	P. E. Bay	34.5	D.	.....	.....	6	D. C.	.....	.....	42.5	C. A. F.e. D.		
"	Stat. II.	38.5	D.	26	D.	.....	A. C. D.	.....	.....	11.5	D. A.		
"	Stat. III.	64.5	D.	164	D.	.....	D.	.....	.....	12.5	D.		
"	Stat. III.	.....	.....	.....	.....	5.5	.....	.....	.....	14+1	D. F.e.		
"	P. E. Bay	12.5	D.	100	D.	15.5	A. D.	.....	.....	4	D. (3 hauls)		
"	Stat. II.	.....	.....	.....	.....	.....	.....	.....	.....	9+12	A. D. C. F.e.		
"	P. E. Bay	6.5	D.	73	D.	21	D.	.....	.....	12+13.5	D. C.		
"	Stat. I.	6	D.	15	D. C. F.e.	.....	.....	.....	.....	20+12	D.		
"	Stat. II.	9	D.	10.5	D. C. F.e. M.	.....	.....	.....	.....	11.5	D. C. F.e.		
"	Stat. II.	4	- D.	8.5	D. C.	.....	.....	.....	.....	8+25	D. C.		
"	Stat. III.	.....	.....	.....	.....	.....	.....	.....	.....	9+11.5	D. C. N.		
"	P. E. Bay	.....	.....	.....	.....	.....	.....	.....	.....	33	C. F.e.		
"	Stat. III.	.....	.....	.....	.....	.....	.....	.....	.....	10.5	D. C. N.		
"	P. E. Bay	.....	.....	.....	.....	.....	.....	.....	.....	13+20	C. D.		
"	Stat. III.	1	D.	.....	.....	.....	.....	.....	.....	12+18.5	D.		
"	Stat. I.	2.5	D.	58.5	D.	15	D.	.....	.....	7+8.5	C. D. F.e.		
"	Stat. II.	.....	.....	9	D. C.	12	O.	.....	.....	11.5+14.5	C. D.		
"	Stat. III.	.....	.....	.....	.....	.....	.....	.....	.....	8+14	D. C. N.		
"	P. E. Bay	.....	.....	.....	.....	.....	.....	.....	.....	16.5+10	C. D.		
"	Stat. I.	9.5	D.	77	D.	9	C. D.	.....	.....	11.5+15	D. C. A.		
"	Stat. III.	.....	.....	.....	.....	19.5	D. A. C.	.....	.....	23.5+16	C. D. BN.		
"	Stat. III.	2.5	D. C. BN.	30.5	D. C. BN.	32	D. C. BN.	.....	.....	16+15.5	C. D. BN.		
"	Stat. III.	.....	.....	.....	.....	.....	.....	.....	.....	26+24	C. D. BN.		
"	P. E. Bay	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		

Apr. 13.	Stat. III.	4.5	D.	15.5	D.	18.5	C.D.	20.5+24	C.D.BN.
15.	Stat. I.	1	D.C.F.e.	10.5	D.	17.5	C.D.	11+5	A.D.C.N.
"	Stat. II.	1	D.C.	13	D.C.	15	C.D.	10+10	D.C.
16.	P. E. Bay	1.5	D.C.M.	10.5	D.C.M.	25	C.D.	21.5+24	C.D.
"	Stat. I.	3+1.5	D.C.O.	10	D.C.	6+10	A.C.D.	12.5+6.5	A.D.C.F.e.
17.	Stat. IV.	5.5	D.	9.5	D.	12	A.C.D.	3+8+7+5.5	A.C.D.
18.	P. E. Bay	2	D.C.	8	D.C.	15	C.D.	9+9.5	A.C.D.
"	Stat. II.	3.5	D.	7.5	D.	17.5	C.D.	25+26	C.D.BN.O.
19.	Stat. I.	1	C.	6	C.	11.5	C.	8+13.5	A.C.D.O.
"	Stat. II.	1.5	C.	1	C.	19.5	C.	23.5+17.5	A.C.D.
22.	Stat. IV.	0.5	ON.C.D.	2	ON.C.D.	18	ON.C.D.	17+17	C.D.BN.
"	Stat. I.	0.5	C.D.F.e.	2	C.D.F.e.	16	C.D.F.e.	18+18	C.D.O.F.e.
23.	Stat. II.	0.5	D.C.	5.5	D.C.	17.5	C.N.F.e.L.	15.5+16	C.D.
"	Stat. I.	0.5	D.C.	5.5	D.C.	17.5	C.N.F.e.L.	16.5+18.5	C.D.O.F.e.
24.	Stat. II.	1.5	ON.C.	2	ON.C.	20	ON.C.D.	11+9.5	C.D.F.e.
"	Stat. III.	1	ON.	2.5	ON.	8.5	C.N.S.	9.5+9.5	C.L.
25.	Stat. IV.	1	ON.	2.5	ON.	9.5	ON.C.	14+27.5	C.D.F.e.
"	Stat. V.	1	ON.	2.5	ON.	9.5	ON.C.	12.5+13	C.
"	Stat. III.	1	ON.	2.5	ON.	9.5	ON.C.	9+11	ON.C.D.
"	Stat. I.	2	D.C.N.C.	7+4	D.ON.C.	12.5	ON.C.	8.5+6.5	C.N.
26.	P. E. Bay	0.5	ON.	0.5	ON.	8	C.ON.	13+16.5	C.
"	Stat. V.	3	D.C.	3	D.C.	11.5	D.C.	20.5+15.5	C.D.F.e.
27.	Stat. V.	2	D.C.	5	D.C.	10	D.C.BO.	7+15	ON.C.D.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	8+10	ON.C.D.
"	P. E. Bay	4	D.C.	5	D.C.	10.5	D.C.	5.5+4.5	ON.C.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	2.5+6	ON.C.D.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	6.5+9	ON.C.D.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	5.5	ON.C.D.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	4+4.5	ON.C.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	6+8	D.C.BO.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	3.5+11.5+7.5	D.C.BO.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	7+13	D.C.BO.
"	Stat. V.	4	D.C.	5	D.C.	10.5	D.C.	6	D.C.F.e.

Dr. ALBERT C. L. G. GÜNTHER then moved:—"That the President be thanked for his excellent Address, and that he be requested to allow it to be printed and circulated among the Fellows"; which was seconded by the Rev. T. R. R. STEBBING and carried unanimously.

On the motion of the President, a telegram of congratulation was sent to the Rector of the University of Upsala in the following words:—

"Linnean Society of London assembled at Anniversary Meeting congratulates University of Upsala on historic Linnean Celebration."

The ballots for Council and Officers having been respectively closed at the times required by the Bye-Laws, the President appointed Mr. Henry Groves, Mr. John Hopkinson, and Mr. George S. Saunders Scrutineers. The votes having been counted and reported to the President, he declared the result as follows:—

For the Council:—VERNON H. BLACKMAN, M.A., LEONARD ALFRED BOODLE, Esq., Prof. GILBERT C. BOURNE, Prof. ARTHUR DENDY, D.Sc., Rev. CANON FOWLER, M.A., Dr. G. HERBERT FOWLER, Prof. W. A. HERDMAN, F.R.S., Prof. JAMES PETER HILL, B. DAYDON JACKSON, Esq., HORACE W. MONCKTON, F.G.S., Prof. F. W. OLIVER, F.R.S., Prof. E. B. POULTON, F.R.S., Lt.-Col. D. PRAIN, F.R.S., Dr. A. B. RENDLE, M.A., Miss ETHEL SARGANT, Dr. DUKINFIELD H. SCOTT, F.R.S., Dr. OTTO STAPP, ROLAND TRIMEN, F.R.S., Prof. FREDERICK ERNEST WEISS, and Dr. A. SMITH WOODWARD, F.R.S.; the retiring Councillors being R. ASSHETON, M.A., Dr. HORACE T. BROWN, F.R.S., CLEMENT REID, F.R.S., ARTHUR EVERETT SHIPLEY, F.R.S., and the Rev. T. R. R. STEBBING, F.R.S.

The President then appointed the same Scrutineers to examine the ballot for the Officers, and the votes having been cast up and reported to the President, he declared the result as follows:—

President: Prof. WILLIAM ABBOTT HERDMAN, D.Sc., F.R.S.

Treasurer: HORACE WOOLLASTON MONCKTON, F.G.S.

Secretaries: Dr. D. H. SCOTT, M.A., F.R.S.,
Prof. ARTHUR DENDY, D.Sc., and
Mr. B. DAYDON JACKSON.

The Secretary then laid before the Meeting, the following papers specially prepared for the celebration of the 200th Anniversary of the birth of Linnæus on the 13/23rd May, 1707.

1. A copy of a letter from Linnæus to Professor Pietro Arduino at Padua, with an introduction by Dr. G. B. De Toni, Hon. F.R.M.S. Communicated by Dr. D. H. Scott, F.R.S., Sec. L.S.

2. On a MS. List of the Linnean Herbarium prepared by Linnæus in 1753-5, with a Catalogue of the genera now existing in the Herbarium, by Benjamin Daydon Jackson, General Secretary.

The PRESIDENT then addressed Mr. Van Roÿen, Councillor of the Netherlands Legation, and in presenting the Linnean Medal to him for transmission to Dr. MELCHIOR TREUB, F.M.R.S., &c., specified as follows the services to science which had weighed with the Council in making this award.

The PRESIDENT said:—

SIR,—It is my privilege, in announcing the award of the Linnean Gold Medal this year to Dr. Melchior Treub, of Buitenzorg, to add, as the mouthpiece of this Society, a few sentences as to the high claims of your distinguished countryman in Java whom we now delight to honour. The Council have selected Dr. Treub from among the Botanists of the world as the man whom they regarded as most deserving of the highest distinction it is in their power to bestow. They hope he may be gratified by this tribute from his fellow-workers in this Society, whereby his name is enrolled in the short list of Botanical recipients of the Linnean Medal extending from Sir Joseph Hooker in 1888 to Prof. Strasburger in 1905.

Dr. Melchior Treub succeeded the late Dr. R. H. C. C. Scheffer as Directeur van 's Lands Plantentuin at Buitenzorg, Java, in November 1880*. Under his administration this renowned Botanical Garden has grown much in material resources and in scientific importance. Dr. Treub has been able especially to add to the Herbarium and the Museum organised by his predecessor a series of well-equipped laboratories for scientific and technical research. One of his earliest acts was to persuade his enlightened Government, with wise liberality, to found a special laboratory reserved for foreign botanists who might visit Java to undertake original research and study the living flora of the Eastern tropics. We have only to recall the names and the work of some of these investigators—Graf zu Solms-Laubach, Goebel, Warburg, Madame Weber van Bosse, A. F. W. Schimper, Karsten, A. J. Ewart, Stahl, Haberlandt, Heinricher are a few from among the many able botanists who have profited by this generous hospitality—to form an estimate of the debt that Botany owes to our present Linnean Medallist.

Dr. Treub's great administrative gifts have been utilised to the full by the Government of the Dutch East Indies, and his work as an organiser has culminated in the establishment in Java of a really scientific "Departement van Landbouw," whereof the Botanical establishment over which he had so ably presided for a

* I am indebted to our Vice-President Colonel Prain and to our Ectanical Secretary, Dr. Scott, for information as to Dr. Treub's career and published work.

quarter of a century forms an integral part. With widened powers and an ampler field for the exercise of his administrative skill, Dr. Treub, as "Directeur van Landbouw," is now in charge of this important State department.

But in spite of the engrossing nature of his official duties and of the exacting character and extraordinary amount of his administrative work, Dr. Treub has found time to undertake much original research, and to bring to completion a large number of scientific studies of great importance and value. Among the more notable of these have been the following:—

His early work on the meristem of the root in Monocotyledons and in the higher Pteridophytes (1876-78) is an elaborate investigation in which a wide view is taken of the questions of affinity involved. In his works on the nucleus (1878-80), Treub first proved the occurrence of multinucleate cells (bast-fibres and laticiferous tubes) in the higher plants, and demonstrated the process of fragmentation (= amitosis). His joint paper with Mellink on the embryo-sac (1880) though short was a valuable contribution to fundamental questions of morphology then much disputed.

From the time of his appointment to Buitenzorg all Treub's principal work has appeared in the "Annales du Jardin Botanique," a splendid publication of which he has long been the editor. Beginning in 1882 with his classical investigation of the pollen-sac, ovule and embryo of the Cycads, and of the remarkable embryology of the parasitic family Loranthaceæ, he went on to equally striking researches of biological interest, on the extraordinary myrmecophilous plant *Myrmecodia*, and on the pitchers of the epiphyte *Dischidia*, and about the same time he described a new category of climbing plants (Hook-climbers, e.g. *Ancistrocladus*). From 1882 to 1884 he continued his investigations of the ovule and embryo in a number of peculiar types, and in the latter year he began the publication of a series of studies of the most fundamental importance on the Lycopodiaceæ, discovering and investigating in the most complete manner the prothallus and embryo in a number of tropical species of *Lycopodium*, and thus filling what had until then been one of the most serious gaps in our knowledge of the Higher Cryptogams. This work extended to 1890, and in the following year Treub, returning to the morphology of Flowering Plants, astonished the Botanical world by the discovery, in *Casuarina*, of a totally new method of fertilisation, the pollen-tube penetrating the tissues at the base of the ovule (chalazogamy) instead of entering by the micropyle.

Another important series of investigations by our medallist has elucidated various cases of parthenogenesis or apogamy, in the parasite *Balanophora*, in a species of Fig, and in the Urticaceous genus *Elatostema* (1898-1905).

In Physiology, Treub's work on the rôle of hydrocyanic acid as the first product of the assimilation of nitrogen by the green plant (1896 and 1904) has been of fundamental importance. No other Botanist has ever made such splendid use of the opportunities

afforded by a great Botanical Garden in the Tropics for purposes of scientific investigation. All Treub's work is characterised by admirable clearness and by sound judgment, his memoirs are beautifully illustrated by drawings entirely from his own hand, and he is distinguished among Botanical writers by his perfection of treatment and style.

I ask you, Sir, to receive this medal for transmission with our most cordial sentiments and good wishes to your distinguished countryman in Java.

The Medal having been formally handed to Mr. Van Roijen, that gentleman made a suitable reply, undertaking to transmit the medal to Dr. Treub.

The Secretary having laid the Obituaries of deceased Fellows before the Meeting, the proceedings ended.

OBITUARY NOTICES.

Major ROBERT CARY BARNARD was born at Cheltenham on 13th December, 1827, but was brought up at Bartlow in Cambridgeshire, where his father lived. He received his education first at private schools, then at Winchester under the Rev. G. Moberly.

In 1847 he received a commission in the 41st Regiment, and served ten years. He went out to the Crimea, but was attacked with fever at Scutari and was invalided home, and on his return to the seat of war operations were over.

On his retirement from the army with the rank of Major, he married and went to New Zealand, intending to settle there; but the death of his wife, two months after their landing in the colony, determined his return home. He then entered at Emmanuel College, Cambridge, and took his degree in Natural Science the first year degrees were granted in that Tripos. Whilst at Cambridge he became acquainted with Professor J. S. Henslow, whose youngest daughter, Anne, he married in 1859.

He settled in Cheltenham and received pupils for the army, besides teaching at Cheltenham College. Ten years later he moved into a house he had built and named Bartlow, after the scene of his boyhood; and there he resided till his death. He busied himself in local work, was a member of the Leckhampton Local Board, was a founder of the Cheltenham Public Library, and took part in the work of the Cheltenham Natural History Society, and was recognised as a leading local botanist and archaeologist. He became a widower in 1899; and in October 1906 the sudden death of his eldest daughter, who was his housekeeper, caused a shock from which he never recovered. Two months later he was seized by influenza, and after three

weeks' suffering he died on 22nd December, 1906, a few days after completing his 79th year, leaving seven children and nine grandchildren.

He was elected a Fellow, 4th April, 1861.

[B. D. J.]

SIR WALTER LAWRY BULLER, K.C.M.G., F.R.S., D.Sc., was born in 1838 and died at Pondtail Lodge, Fleet, Hants, on July 19th, 1906. His father was the Rev. James Buller, of Canterbury, New Zealand. He was educated at Auckland and studied afterwards under the well-known naturalist, William Swainson, F.R.S., who was living in the colony. While still young he took an active part in the affairs of the Colony and held various official appointments, in which his thorough knowledge of the Maori language was of much service. When he was thirty-three years of age he came to London as Secretary of the New-Zealand Agency. In 1873 he published his celebrated and magnificently illustrated monograph on the Birds of New Zealand, of which a second edition appeared in 1888. His name will always be remembered as that of one of the great pioneers of New Zealand Natural History. He was elected a Fellow of the Linnean Society, 21st January, 1858.

[A. D.]

EDWARD CHAPMAN, who died at Hill-end, Mottram in Longdendale, Cheshire, on the 25th July last, was the son of John Chapman, M.P., and was born on the 12th October, 1839. He matriculated at his father's college (Merton) in 1860, where he had as contemporaries W. C. Sidgwick and (Bishop) Creighton. In 1863 he married Elizabeth Beaudoe, daughter of F. Grundy of Mottram, and took his degree the following year—First Class Honours in Natural Science. Following this he became Tutor in Natural Science in his own college. The development of the Manchester, Sheffield, and Lincolnshire Railway (in which he had an hereditary interest) into the Great Central Railway compelled him at a later period to withdraw from academic life and residence; but Magdalen College in 1867 re-elected him "Fellow without emolument," a position he highly valued, as enabling him to keep touch with old Oxford friends. His chief scientific work was done in the Daubeny Laboratory at Magdalen, one of his old pupils, Mr. R. T. Günther, succeeding him as Tutor.

The causes which compelled him to remove from Oxford continued operative during the rest of his life. He was Deputy-Chairman of the Great Central Railway, Lord of the Manor of Hattersley, Chairman of various local bodies, Justice of the Peace, and Member of Parliament for the Hyde Division of Cheshire from 1900 to 1906. He was elected Fellow of the Linnean Society, 2nd May, 1872.

[B. D. J.]

No loss during the past Session has inflicted so deep an impression on this Society as the unexpected death of CHARLES BARON CLARKE last summer. The eldest son of Turner Poulter

Clarke, he was born on 17th June, 1832, at Andover, a town he loved to term "the Metropolis" and boast of the many notable worthies it had produced. He obtained his early education at King's College School, thence going up to Cambridge, at first at Trinity College, migrating later to Queen's College. Amongst his contemporaries were Henry Fawcett, Leslie Stephen, John Rigby, and one whom he ever regarded as the chief of his set, Edward Turner, whom weak health and the management of a large estate debarred from showing the abilities with which he was endowed, to the world at large. He graduated in 1856, and was bracketed Third Wrangler in that year; in 1857 he became Fellow of Queen's College, and for nearly ten years remained at Cambridge as College Tutor in Mathematics. In 1858 he was called to the Bar in Lincoln's Inn, but never practised in the Courts, till in 1866 he left for India to join the uncovenanted staff of the Education Department, at first at the Presidency College, afterwards as Inspector of Schools. For two years, from 1869 till 1871, he was Acting Superintendent of the Royal Botanic Garden at Shibpur, near Calcutta, filling the interval caused by the death of Dr. Thomas Anderson until the appointment of the then Dr. George King. He resumed his education work till 1877, in which year he returned to Europe on two years' furlough. Before this he had made his first essay in botanic literature by printing a list of Andover plants, at Calcutta, in 1866; and H. C. Watson, in a review in the 'Journal of Botany,' v. (1867) pp. 51-59, made sport of the "Price Threepence,"—a review which was resented by Clarke, who extorted an apology by threatening legal process, and published his rejoinder in the same journal, vi. (1868) pp. 215-218. His second book was the folio 'Commelinaceæ et Cyrtandraceæ Bengalenses,' in 1874, at Calcutta, and a third his 'Compositæ Indicæ,' in 1876, which he had to correct on his up-country journeys, much to his annoyance, as expressed in the preface. He had found the want of a handy volume on the flora of India, and accordingly reprinted Roxburgh's 'Flora Indica' verbatim in 1874. On the termination of his leave in March 1879 Clarke was put on special duty at Kew, to elaborate some portion of Sir J. D. Hooker's 'Flora of British India'; and in the second volume of that work appear about 284 pages from his pen, beginning with Saxifragaceæ and closing with Cornaceæ. These were issued in 1878-79. In the next volume he was responsible for 244 pages, from Caprifoliaceæ to Salvadoraceæ, in 1880-82; the fourth volume a still larger share, ending with Verbenaceæ, in 1885. Concurrently with this he prepared and issued through our 'Transactions' the three parts of his "Review of the Ferns of Northern India" (ser. II. Bot. vol. i. pp. 425-611, pls. 49-84).

He returned to India in 1883, and in 1885 was transferred from Bengal to Assam, where he remained till his retirement in 1887 at the age of 55.

From an early period Clarke had collected plants, in England,

Scotland, Switzerland, and Madeira. In India he threw himself into the pursuit with immense energy. For a full account of his Indian journeys, reference should be made to the 'Kew Bulletin,' 1906, n. 7, pp. 272-274, where Lieut.-Colonel Prain has drawn up a statement showing the use made of long holidays to explore distant parts of India, from Assam to Kashmir and from Sikkim to Madras. His field-numbers were extensive: his first herbarium contained 25,000 plants in 5000 species, and he appended field-tickets each evening giving full particulars, so that his specimens possess a very high value. He presented the whole to the Royal Botanic Gardens, Kew—the first part in 1877, the last in 1888.

On his final home-coming in 1887, he settled at Kew, living with his brother, Poulter Clarke, and working assiduously all day in the Herbarium. From this time onward his attention became concentrated on the Cyperaceæ, though not exclusively, for he still continued to work at Acanthaceæ, and two memoirs on these plants are awaiting publication.

On Cyperaceæ he had become an acknowledged authority, and foreign collections came to be named, and herbaria containing types were freely lent to Kew for his examination. The fruits of these labours appeared from time to time in papers on sections of floras, of which the principal may be mentioned, as follows:—In our own issues, 'Transactions': the Ferns of Northern India, in 1880, as previously mentioned; the Cyperaceæ of the Malay Peninsula (1893), Mt. Kinabalu (1894), and Matto Grosso (1895); also the Commelinaceæ of the last region (1895). In our 'Journal': the Commelinaceæ of Bengal (1870); Indian Gentianaceæ (1875); Botanic Notes from Darjeeling to Tonglo (1876); Indian Begonias (1880); Madagascar Species of *Cyperus* (1883); *Hemicareæ* of Bentham (1883); Indian Species of *Cyperus* (1884); Plants of Kohima and Muneypore (1889); authentic Cyperaceæ of Linnaeus (1894); the Subsubareas of British India [= on distribution of Cyperaceæ] (1898); the Cyperaceæ of the Chinese Flora (1903-4) and *Carices* of Malaya (1904). In our 'Proceedings,' his two Presidential Addresses (1895-6). The 'Philosophical Transactions,' B. (1892): on Biologic Regions and Tabulation Areas, with map. In the 'Journal of Botany': a revision of *Lea* (1881); *Eleocharis* of Europe (1887); and 17 smaller papers and reviews. Engler's 'Botanische Jahrbücher' (1901-6) contain three papers, the longest on Chilian Cyperaceæ; the 'Botanisk Tidsskrift' also three; 'Bulletin de l'Herbier Boissier' eight, the chief being Clarke's determination of Hassler's Sedges (1903). He was also responsible for Acanthaceæ and Commelinaceæ in the 'Cape Flora'; and with Mr. J. G. Baker worked up the Gesneraceæ for 'Tropical Africa,' and completed the Acanthaceæ, which had been begun by Mr. Burkill, for the same work, from p. 44 to p. 262. A detailed list will be found in the 'Kew Bulletin' already mentioned, pp. 276-281. The last memoirs of his to see the light are his posthumous "Cyperaceæ of the Philippines: a List of the Species in the Kew Herbarium," in the 'Philippine Journal of Science: Botany,' vol. ii. April 1907, pp. 77-110; and the

Cyperaceæ in A. Chevalier's "*Novitates floræ Africanæ*" in Bull. Soc. Bot. Fr. liv. (1907) Mém. 8, pp. 26-29. Two treatises on Malayan Acanthaceæ are to be issued this autumn, the first in the '*Journal of the Asiatic Society of Bengal*,' and the second in our own '*Journal*.'

He was President of our Society from 1894 to 1896, and served on our Council almost continuously from 1880-1906, and Vice-President similarly from 1881-1905. Assiduous in his attendance, he was ever ready to bear his part in the discussion of papers read before the Society; and his wide and long experience of men enabled him to intervene with peculiar and happy results. He was a delightful man in private talk, ready and willing to converse on various matters, scientific, literary, or controversial. This is not the place to enlarge on his ultra-scientific labours; but he wrote and distributed many pamphlets on topics of the day, and took a very active part in electioneering for Henry Fawcett. An irksome delay on one of his Indian journeys was beguiled by his sitting down to compile an arithmetic book for Bengalis; and he also drew up manuals of geography for school use. The large output to be credited to him was due to his writing much of his work in the evening; but this did not prevent his being up betimes the next morning, for a run before breakfast. In the last few years he had taken to bicycling, and his favourite course was a spin round Richmond Park. He was a sturdy and almost tireless rider; once mounted he would ride to Andover, 60 miles, without dismounting, yet he never acquired a mastery of his machine. He could not look round, raise his hand from the handles, or get on or off on the level. He never rode except in broad daylight, and never carried a lamp, bell, or brake on his machine: yet he never had a serious mishap.

He was elected a Fellow of our Society, 5th December, 1867; of the Royal Society in 1882; and of the Geological Society in 1868. Next to botanising, he enjoyed the excursions of the Geologists' Association, where his powers of walking were shown to advantage. His character is well epitomised in the sympathetic notice contributed by an intimate friend to the '*Journal of Botany*' for November last (p. 375), where it is said:—"Clarke, particularly as he advanced in years, became very catholic as regards channels of publication. His earlier papers are frequently piquant, not to say pungent, as well as clear. He grew old with infinite grace; and while the pungency largely disappeared from his contributions, the lucidity remained. The kindest of men, the most modest and the most unselfish, he was always ready to help others, was a charming host, and a staunch friend." In the same memoir is the latest portrait taken of our deceased Fellow, which is strikingly like, though it did not please the sitter; it is full face, and without spectacles, which may account for this judgment, as it must be remembered that Clarke's sight, though very strong, was very short.

The writer recalls the painful shock when, travelling home from his summer holiday in the north, he procured a London news-

paper, and in that a brief paragraph told of the end of a career which four weeks earlier seemed so full of promise for an old age of prolonged work. He came of a long-lived family: both his uncles, Fellows of this Society (Mr. Benjamin Clarke of Hampstead and Mr. Joshua Clarke of Saffron Walden) attained a great age, as did many others of his family. In August he visited Andover on his bicycle; the return was made on a hot day, and he seemed overpowered by the heat and drank tea eagerly. The night did not bring its usual sound sleep; so in the morning he rode round Richmond Park, with difficulty. On reaching home, he went to bed and sent for a doctor, who pronounced him to be suffering from paresis of the lower bowel. An operation was performed that day, but though the strong constitution of our late colleague withstood the shock of the operation at the time, after ten days of suffering he passed away on Saturday, 25th August, 1906 in the 75th year of his age. He was buried at Andover five days later.

It is computed that the voluminous manuscripts he left at his death, containing the enormous mass of detailed examination of material from every quarter and from books, would amount to more than 3000 pages: whether this can ever be printed is problematical. Amongst these are 144 plates, printed chiefly in collotype, from selected drawings made under his close supervision. It is to be hoped that these at least may be issued, as they illustrate his views of genera, accompanied as they are by printed descriptive text.

His completion of the Rev. R. T. Lowe's 'Flora of Madeira' is practically ready for press: at the time of his death he was getting together materials for a life of the author. [B. D. J.]

Professor Sir MICHAEL FOSTER, K.C.B., was born at Huntingdon on 8th March, 1836; he died, almost suddenly, in London on the early morning of 29th January, 1907. Between these dates lay a life full of activity and one which made an impression upon the scientific thought of the age. Foster was educated at Huntingdon Grammar School, and later, from 1849 to 1852, at University College School, London, and then at the College, from which he took the B.A. degree with a Scholarship in Classics at the London University. In 1858 he passed the London M.B. Examination, and took his M.D. the following year. During the next two years he continued his medical education, partly at Paris, and found time for some original research. In 1861 he settled down to practise his profession in Huntingdon, but six years later he abandoned medicine and returned to University College, first as Teacher in Practical Physiology, and in 1869 as Professor of the same subject. Before coming to Huntingdon he had some symptoms of pulmonary trouble, which, however, soon disappeared, and for them he was recommended to take a voyage on the steamship 'Union' to the Red Sea.

Foster's intimate friendship with Huxley had a marked influence

upon his career. Together with Ray Lankester and Rutherford he acted as demonstrator in 1870 to Huxley's first practical course of Biology held at South Kensington; he succeeded Huxley as Fullerian Professor at the Royal Institution, and as Biological Secretary of the Royal Society, and it was largely due to Huxley's recommendation that in 1870 Foster left London and came to Cambridge as Prælector in Physiology at Trinity College.

The mark made by Foster on the thought and on the science of his times falls, broadly speaking, under three heads. He was a great teacher, profoundly influencing those who came into personal contact with him. He was a great writer and the author of a classical text-book which spread his influence far beyond the walls of his lecture-room and Laboratory. He was a most capable organizer, and first at Cambridge, and later in London, he initiated and carried to a successful issue many important schemes for the advancement of Science.

When he first came up to Cambridge the University was able to assign him only one room, now part of the Philosophical Library, and this served him both as laboratory and as lecture-room. Here he gathered around him a small band of pupils, stimulated by his enthusiasm to devote their lives to his science. Amongst these may be mentioned Walter Gaskell, Frank Balfour, J. N. Langley, A. Sheridan Lea, A. G. Drew-Smith, H. Newall-Martin, A. Milnes Marshall, S. H. Vines, and, later, many others. His principle of teaching involved much practical work. He held "that a student must see and do things for himself in order to gain a real and lasting hold on any scientific subject." He was always ready to discuss difficulties and to suggest solutions to difficult problems. At his coming to Cambridge the Medical School, fostered by the care of Sir George Paget and Sir George Humphrey, was already flourishing; but it now grew to be one of the largest Faculties in the University, and Foster was soon lecturing to large audiences. At his prime, Foster was a remarkable lecturer, deliberate, slow, reasoning out his subjects as he went along, and, avoiding dogmatic statement, he made his audience think. He had an admirable skill in making histological sketches with but few lines, and always with three coloured chalks. He used little gesticulation, stood very still, rolling the chalk in his hands, and occasionally giving forth most gravely some humorous thought which was punctuated by a little up-look at the class, and sometimes by his characteristic half-suppressed chuckle.

During the early years at Cambridge, and before in London, Foster published several original memoirs, which are enumerated by Professor Langley in his article in the 'Journal of Physiology'*. Later the pressure of other work prevented his investigating himself, but he was the cause of much research in others, and he took the keenest and deepest interest in the work carried on by his pupils.

Foster's 'Text-book of Physiology' is a classic. The first edition appeared in 1876, and there were many editions until, growing as

* Vol. xxv. 1907, p. 233.

the subject grew, it necessarily split into several volumes, and as the aid of other writers became imperative it lost something in the unity of treatment, and eventually became too large for the ordinary medical student. As in his lectures so in his text-book he avoided dogmatic statements. He gave the various views, discussed them, pointed out the difficulties, and sometimes—but not always—summed up in favour of one view. His graphic literary style gave distinction to the work, and some chapters rise to a high level of eloquence. The book was a great success and was translated into several of the chief European languages; its philosophic breadth of view greatly helped the recognition of Physiology as a complete and independent science. The charm and humour of Foster's style are perhaps best shown in his short memoir on Claude Bernard, and especially in his 'History of Physiology during the 16th, 17th, and 18th Centuries,' which embody the lectures he gave at the Cooper College, San Francisco, in 1900. Foster published several other books and many articles, all of them characterised by an admirable clearness and felicity of expression. He also founded, in 1878, the 'Journal of Physiology,' and edited it until 1894. In this connection it may also be mentioned that Foster was exceptionally happy as an after-dinner speaker, a post in which his sense of humour was allowed full play. As an organizer Foster did an immense work in starting and guiding many of the modern movements in Biological teaching. Botany, Animal Morphology, and Physiology as taught in England owe much of their present methods to him. For many years he took an active part in University affairs, and sat upon the Council of the Senate from 1886 to 1890, but the increasing demands of the Royal Society and of various Commissions which compelled him to be more and more in London gradually left him but little time for affairs in Cambridge.

In 1881 Foster succeeded Huxley as Biological Secretary of the Royal Society, and from that date onwards he gave an immense amount of time and energy to its affairs. He widened the basis of the activities of the Society, advocated its more intimate relation with the Government, and was the trusted adviser of the Treasury in scientific matters. He took a considerable part in starting the National Physical Laboratory, the International Congress of Geodesy, the International Catalogue of Scientific Papers, and the International Association of Academies. To him was largely due the founding of the Physiological Society, over which he presided in 1898 at the Cambridge Meeting. He served on the Royal Commission on "Vaccination," on that of the "Disposal of Sewage," was Chairman of the Treasury Departmental Committee on "Botanical Work and Collections at the British Museum and at Kew," 1900-1, and was Chairman of the "Tuberculosis" Commission at the time of his death. For nearly forty years Foster was a member of the Linnean Society. He was elected Jan. 16, 1868; he also sat on several Departmental Committees, served on our Council in 1870-71, and again in 1880-81.

Foster was an active member of the British Association, taking his full share of the secretarial work of both the Sections and the Council. He was President of Section L (Physiology) at the Toronto Meeting in 1897, when he delivered an address on the salient features of physiological activity in recent years, and President of the Association at the Dover Meeting in 1899. In that year he was created a Knight Commander of the Order of the Bath.

In 1900 he was elected to Parliament as Representative of London University, and sat as its Member till Mr. Balfour's Government resigned. Foster was not a party man, but he most faithfully represented the world of science, and when he spoke his words were weighty. Still, as things are now, a Member of Parliament who puts the State above the party is apt to receive cold looks from the official managers, and on seeking re-election, in 1906, Foster lost his seat by twenty-four votes.

Foster was one of the men who counted during the last half of Queen Victoria's reign. To him education owes much, and through his pupils his influence is an ever-widening one. He initiated many new organisations for co-ordinating and advancing science, and through these his name will be perpetuated. He was wise in council, sound in judgment; very helpful and encouraging to his pupils; very persuasive. Above all, he had a gift for friendship which to many has made the world a poorer place since, last January, they heard the news of his sudden death.

[A. E. SHIPLEY.]

FREDERICK ERNEST GRANT was born at Farlesthorne, Lincolnshire, on 23rd March, 1866, and died at Sydney, Australia, 31st January, 1907. In 1883 he emigrated to New Zealand. Five years later he entered the service of the Union Bank of Australia. While stationed at the Auckland branch he formed a collection of natural history, and gained a good knowledge of the local fauna, especially of the mollusca.

When the Bank transferred him to the Melbourne office, he much appreciated the wider intellectual horizon which life in a large city opened for him. He became an active member of the local scientific societies. At first geology was his chief hobby. From 1901 he published, in conjunction with Mr. E. Ihle (now Govt. Geologist of Nigeria, Africa), several articles on geology in the 'Proceedings of the Royal Society of Victoria.' Remarking that no local student had undertaken investigations in crustacea, he adopted the vacant field of carcinology. With Mr. S. W. Fulton he wrote in the Trans. Roy. Soc. of Victoria a series of papers entitled "Some little-known Victorian Decapod Crustacea, with Descriptions of new Species" (1901-6), and a "Census of the Victorian Decapod Crustacea," of which one part only has appeared. It was in 1901 that Messrs. Fulton and Grant reported the curious fact that they had found the common shore-crab of Great Britain living in Port Phillip, Victoria.

In 1902 Mr. Grant re-visited England and took the opportunity of studying the carcinological collection of the British Museum. He attended several Meetings, and was elected a Fellow of the Linnean Society, 18th December, 1902.

On his return to Australia, the Bank transferred him to the Sydney office. He immediately took an active share in the scientific life of that city, and was elected to the Council of the Linnean Society of New South Wales. In 1904 he joined an expedition organised by Mr. C. Hedley for biological work on the Great Barrier Reef. With the assistance of Mr. A. R. MacCulloch he reported on the Crustacea obtained by the party. He also accompanied two deep-sea dredging-expeditions. In the 'Proceedings of the Linnean Society of New South Wales' he published an account of the crustacea obtained by the first, and was engaged in writing up that of the second at the time of his decease. A posthumous paper on the Crustacea of Norfolk Island will appear shortly. He leaves a widow and three children. [C. HEDLEY.]

SIR THOMAS HANBURY, K.C.V.O., who was born at Clapham, near London, 21st June, 1832, and who died on the 9th March, 1907, belonged to a family who had for several generations been members of the Society of Friends. Sir Thomas spent nearly twenty years in Shanghai, where he was a leading merchant, much beloved by the Chinese commercial community on account of his kind and sympathetic, but at the same time just, treatment of them. During a visit paid to England in the year 1867 he acquired by purchase the Palazzo Orega, situated on a beautiful spot on the Italian Riviera, about four miles from Mentone on the west, and about twice as far from Bordighera on the east. This house had been in former times the property of the Orega family of Ventimiglia. With the house he acquired also the extremely picturesque ridge which extends from the village of La Mortola to the sea, into which it projects as a long narrow promontory of about 50 acres in extent. Retiring from China and relinquishing his business career a few years later, Sir Thomas settled in the Palazzo, which he enlarged considerably, and it remained his home until his death. For many years he occupied himself in transforming the La Mortola ridge into one of the most picturesque gardens in Europe. Full advantage was taken of the natural features of the ground so as to secure good landscape effects, and the views along the coast stretching from Bordighera to Mentone were perfectly charming. There was a total absence of vulgarity, and no suggestion whatever of carpet- or ribbon-bedding and other undesirable forms of horticulture.

The La Mortola ridge is bounded on the east by a picturesque ravine, the further side of which lies within the Principality of Monaco. Here is a tract of country which, in times past, had been almost entirely denuded of its natural vegetation by the ravages of goats in search of food and by peasants in search of fuel. A piece of this bare tract was leased by Sir Thomas and was most

strictly preserved by him, not a single twig being allowed to be cut, or a single bird or mammal to be shot or snared. It was Sir Thomas's desire to allow the normal vegetation to recover, and thus to restore that area to its natural condition. Very little planting was therefore done within this protected area, and the few species which were selected for introduction were of sorts little likely to hybridise with indigenous species.

The soil of the La Mortola ridge is very poor and its rainfall is scanty. The plants which were most suitable for introduction on it were naturally those of Southern Europe, the Levant, the South and West of Africa, Mexico, and Australia. A large proportion of these are succulents, and some of the specimens of these, such as *Agave* and *Aloe*, are particularly fine. La Mortola was cultivated by Sir Thomas on the lines of a Botanic Garden, and a free and most generous distribution and exchange of seeds, living plants, and specimens was regularly carried on with gardens all over the world. The grounds were, moreover, thrown open to the public on two days a week, and were frequented by numerous visitors. The present Curator, Mr. Alwyn Berger, is an excellent botanist, who has for some years been engaged in the preparation of a series of monographs of succulent plants, the first of which (on the *Euphorbias*) was issued a few months prior to Sir Thomas's death. Two editions of an excellent popular account of the Botany and Zoology of the Riviera by a friend writing under the initials "C. C." [Comerford-Casey] were printed at Sir Thomas's expense. The second edition of this most useful work is profusely illustrated. Located in a building within the grounds is an excellent Herbarium of plants grown in the garden, and also of those indigenous in its neighbourhood; and in another building is preserved a collection of Roman antiquities found in the district.

Although resident in England for only a few months in each year, Sir Thomas's interest in English Horticulture remained very keen, and this led him, in the year 1903, to buy from the heirs of the late Mr. G. F. Wilson the well-known garden at Wisley, where that enthusiastic gentleman had brought together his splendid collection of rare and interesting species. Sir Thomas also bought sixty acres of land adjoining the garden proper, and presented the whole to the Royal Horticultural Society of England. He also presented to the Pharmaceutical Society of England the magnificent collections of specimens of drugs and the library of books on Pharmacy (some of them very rare) which had been bequeathed to him by his late brother, Daniel Hanbury, F.R.S., author (in conjunction with Professor Flückiger, of Strassburg) of the well-known 'Pharmacographia.' These latter gifts are now located in the Society's Museum in Bloomsbury Square. Sir Thomas's benefactions to Italy were numerous and varied. He founded and endowed the Hanbury Botanical Institute in the University of Genoa; he also founded and supported the Prehistoric Museum near Mentone, in which are preserved the most interesting of the fossil and prehistoric remains dug out of the caverns in the high

cliffs on the coast near Mentone. But, besides these benefactions of a scientific nature, Sir Thomas's works of charity and benevolence were unbounded, and many of them had the great merit of being practically done in secret. The neighbouring ancient town of Ventimiglia was indebted to him for the rescue and re-habilitation of a valuable and ancient library which for years had lain forgotten in the cellars of a convent; for schools, avenues of trees, gardens, and for much aid to its hospital. His reputation for generosity and goodness of heart was known to the inhabitants of every valley in the mountains to the northward of Ventimiglia and Mentone, and to the cry of the poor and distressed among them his ear was ever open. The love and reverence with which he was regarded was strikingly shown at his funeral, several thousands of peasants having followed the hearse which conveyed his body to San Remo to be cremated. He will be terribly missed by the poor for whom he had done so much.

Sir Thomas was created by the Government of Italy a *Comendatore* of the Orders of SS. Maurizio e Lazzaro and of the Cross of the Crown of Italy, and soon after the succession of Edward VII. to the throne of England he was made a Knight of the Royal Victorian Order. He became a Fellow of this Society, 5th December, 1878. [GEORGE KING.]

FREDERICK JUSTEN was born at Bonn on the 29th February, 1832, and there began his acquaintance with the business of a bookseller. On the recommendation of an English visitor to that town, he came to London, and entered the house of Dulau & Co., as German assistant; in course of time he succeeded to the proprietorship of the business. When, in 1863, William Pamplin, A.L.S., retired from the business which he carried on in succession to Hunneman, who died in 1839, the natural history department of Dulau's received an impetus which resulted in Mr. Justen's subsequent and close connection with the heads of the various Departments of the British Museum. By his means the departmental and general libraries at the Natural History Museum, Cromwell Road, assumed their admirable equipment. A friend of Dr. Welwitsch, he became one of his executors, and had to encounter a lawsuit brought by the Portuguese Crown to recover the whole of Dr. Welwitsch's Angolan Collections: in the end a compromise was effected; the Portuguese Government acquired the title to the collections, and gave the second set to the British Museum, with a full copy of the notes by the collector, and the law costs of the whole litigation.

Mr. Justen was elected Fellow, 16th December, 1886, and was a regular attendant at the Meetings; the splendid copy of L'Héritier's '*Stirpes Novæ*,' with its cabinet now exhibited in the Library, was a gift from our late Fellow, who preferred to place it in a secure position, rather than it should be sold after his death. His son predeceased him, but he leaves a daughter and grand-daughter. He died at his house in Soho Square on the 20th November, 1906, aged 74. [B. D. J.]

The death of Mr. WILLIAM MITTEN on July 27th, 1906, has severed one of the few remaining links connecting the botanists of the first half of the nineteenth century with those of the present day. He was elected an Associate of the Linnean Society on Jan. 19th, 1847, and was, at the time of his death, the oldest on the list of Associates. He was born at Hurstpierpoint, in Sussex, on Nov. 30, 1819. He was apprenticed to a chemist, named Saxby, at Lewes, and it was during this period that he evinced a decided taste for natural history, devoting all his spare time to the study of various branches of British botany. After leaving Lewes he stayed in London for a time as assistant with a wholesale chemist named Yates, and it was apparently during his residence there that in May 1843 he sent his first contribution to the 'Phytologist' concerning the discovery of *Bupleurum tenuissimum* at Highgate. This was followed by the finding of *Carex montana* at Eridge, and the rare fructification of the moss *Aula-comnion androgynum* in Abbey Wood. He settled at Hurstpierpoint, Sussex, soon after this period. As a keen observer and gifted with unusually critical faculty in discriminating between closely allied species, he early attracted the attention of William Borrer, who resided at the neighbouring town of Henfield.

Mr. Borrer took great interest in his work, allowed him the use of his valuable library and gave him an excellent microscope, and probably introduced him to Sir William Hooker. On Dec. 19, 1844, Mr. Mitten married Miss Ann Jordan at Abbots Ripton, Huntingdonshire. His first letter to Sir William Hooker, in Dec. 1846, was in connection with a paper on the parasitism of *Thesium*, which appeared in Hooker's 'London Journal of Botany' in 1847, and was evidently considered to be of unusual interest, since it was repeated in the 'Annales des Sciences Naturelles.' In 1848 he published descriptions of new British plants in the same Journal, and wrote for the Supplement to 'English Botany' the description of *Gymnomitrium adustum* (t. 2925) and *Lolium linicola* (t. 2955). About this date his attention was especially directed to Musci and Hepaticæ, for although he had begun their study in 1843, it was not until after the death of Thomas Taylor in February 1848, who had been associated with the Hookers in working at the various collections received at Kew, that he published much in these branches of botany, but from 1851 onwards he became recognised as the British authority on Musci and Hepaticæ. Sir William Hooker desired to retain his services and offered him the post of Curator of the Herbarium in place of J. E. Planchon, but Mitten declined for financial reasons, preferring to carry on his botanical studies in such limited time as could be spared from work in his pharmacy. For many years the collections of Musci and Hepaticæ received at Kew from all parts of the world were handed to him for identification and description. His first important contribution, apart from short notes, was a Catalogue of the Cryptogamic plants collected by Jameson in the vicinity of Quito, published in the 'Kew Journal

of Botany' in 1851, pp. 49-57 and 351-361, and the last was published conjointly with C. H. Wright, of the Kew Herbarium, on the Muscinæ of Mt. Kinabalu in North Borneo, in our 'Transactions,' ser. 2, Bot. iv. (1894) pp. 255-261. His numerous contributions to our Journal began in 1859, and his most comprehensive work, the 'Musci Americani,' containing Latin descriptions of 1745 species, including many new ones, which took up the whole of the twelfth volume, was published in 1869. The work of Mitten in Bryology may be compared to that of De Candolle on Phanerogams, since he was the first to arrange them in strictly natural groups. Up to the date of the publication of Mitten's paper on the "Musci Indiæ Orientalis" in 1858, mosses were classified principally according to the character of their spore-cases, although C. Müller, in his 'Synopsis Muscorum,' had already, in 1849, utilised the leaf-structure in the characters of tribes and genera. In this paper (Journ. Linn. Soc., Bot. iii. (1859) Suppl. pp. 1-6) Mitten pointed out the greater importance of the structure of the leaf for purposes of classification and relegated to the second place the characters derived from the peristome. This new method of classification was followed by Dr. Braithwaite in his classical 'British Moss Flora,' and in the 'Popular Science Review,' 1871, p. 374, he remarks concerning it: "Believing these views to be strictly in accordance with facts derived from careful study of the plants themselves and therefore true to nature, I feel bound to adopt them, though I have ventured to deviate a little from the arrangement, believing that the retention of the acrocarpous and pleurocarpous system is certainly convenient." It has also been adopted by Dixon and Jameson in their popular 'Handbook of British Mosses,' with slight alterations, which are convenient, rather than in accordance with the principle outlined by Mitten. The extraordinary amount of work accomplished by Mitten during a long series of years, without neglecting his work in the pharmacy, must have puzzled many of his correspondents. Those to whom he was personally unknown probably regarded him as a bad correspondent, for he never wasted a moment in unnecessary replies to enquiries made by those who wished to save themselves the trouble of examining specimens, as so many dabblers in botany do; but anyone who sent a specimen, probably new, or showing that time and trouble had been expended on it by the sender, received a prompt and courteous reply. By thus limiting his correspondence, and utilising all spare moments for work with his microscope, he was able to do an astonishing amount of literary and scientific work and to spare a little time for horticultural experiments. During his later years he was much assisted by his daughter Flora, who qualified herself, by passing the Examination of the Pharmaceutical Society, to carry on the work of the pharmacy. One of his greatest pleasures was to sift the mosses sent from foreign countries for chance seeds to try and grow them. He thus obtained several plants from remote islands visited by the 'Challenger' Expedition. His few hybridising experiments

resulted in a hybrid *Campanula* with variegated foliage, which was taken up by a neighbouring florist, and in a hybrid pink between *Dianthus alpinus* and *D. Gardnerianus*, and possibly others. But his garden was always an interesting one to visit on account of the number of rare British plants that found a congenial home there. Although he rarely visited London and was almost unknown in botanical circles, owing to his modest and retiring disposition, he was highly respected in his native town, and his advice was constantly sought by his fellow townsmen in all important public and even private personal matters. He was gifted with a strong vein of quiet humour and very keen perception, but he had a kind and lovable disposition, and was never known to make an unkind remark concerning anyone, preferring to be silent when nothing good could be said. The late Bishop Hannington and Dr. H. M. Holman were his most intimate friends, and with the former he made many botanical excursions in Devonshire and elsewhere. Mr. Mitten retained his faculties to the last, and shortly before his death described a new species of Scalemoss, *Lophocolea alata*, which he had detected in 1875 in North Devon, and allowed Miss C. E. Larter, who was interested in North Devon botany, to publish.

An excellent portrait of Mitten is given in the October number of the 'Journal of Botany' for October 1906. He leaves a widow who is 93 years of age, and still in the full possession of her faculties, a daughter who is the wife of the famous naturalist Dr. A. R. Wallace, and two unmarried daughters, one of whom still carries on the Pharmacy at Hurstpierpoint.

Mr. Mitten's entire collection of Mosses and Hepaticæ were at his request offered to Mrs. N. L. Britton, a keen American bryologist, who had made his acquaintance some years previously. The collection, at her instigation, was purchased for the Herbarium of the New York Botanical Gardens. Details of the Collection are given in the 'Journal of the New York Botanical Gardens' for February 1907, pp. 28-32. The entire collection abounds in beautiful drawings, which as well as memoranda and original descriptions, were usually laid in the covers with the specimens. Dr. A. R. Wallace has stated concerning the collection:—"I am inclined to think that they constitute the richest, or nearly the richest, private collection of these groups in existence, whilst it is doubtful if any public collections are much richer. Of all the collections he received to name and describe he received sets for himself, and thus accumulated an enormous collection. The loss of the collection to this country is much to be regretted, but it is understood that Mrs. Britton will return the British specimens to England, where they will doubtless speedily find a suitable home."

Mr. Mitten was an Honorary Member of the Linnean Society of New South Wales and of the New Zealand Institute, of the South-Eastern Union of Scientific Societies, and of the Brighton Natural History Society. [E. M. HOLMES.]

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Although failing health during the last two years had warned the numerous friends of HARRY MARSHALL WARD that his life was approaching its term, yet the news of his death at Torquay on Sunday night, the 26th August, came as a shock to many.

Born in 1854 at Hereford, his early years were spent in the country, where he acquired a love of botany in the field. Early in the seventies he came under the influence of Darwin's researches, and in 1874 he began attending the biological course under Prof. Huxley at the School of Science, South Kensington, in succession to his early education at Owens College, Manchester. The following year, a course of practical botany, perhaps the first in modern sense arranged in this country, was carried out by Professor (now Sir) W. T. Thiselton-Dyer and Professor Vines. Both were struck by the promise of one of the pupils, and at their suggestion, in the spring of 1876, he became a candidate for an open scholarship in natural science at Christ's College,

Cambridge, and succeeding, he went into residence in October of that year. He found himself amongst congenial companions, amongst them Professor F. O. Bower, Dr. Hill (now Master of Downing College), Professor Hillhouse, and Dr. Walter Gardiner, attending physiological and morphological zoology under the late Sir Michael Foster and F. M. Balfour.

The opportunity of residence at the University came about under singular circumstances. An anonymous letter came to him saying that if he would enter at Cambridge he would find a sufficient sum to pay his expenses at Mortlock's Bank. His success in winning his scholarship thus assured him of means to pursue his studies, and very shortly after this, in November of the same year, the unknown benefactor died at sea; but having provided in his will for the continuance of the subsidy, he proved to be a young pupil of Huxley's, Mr. L. A. Lucas, who had evidently observed the promise of distinction shown by Ward. A first class in the natural history tripos brought his Cambridge undergraduate career to a close in 1879.

We may rejoice that one of the earliest results of investigation was a paper on the embryo-sac, which was read before this Society, 20th November, 1879, and published in the 'Journal' (Botany, vol. xvii. (1880) 519-546, pls. 17-25).

For some months he worked at Würzburg under Sachs, and then in 1880 he was commissioned to proceed to Ceylon to investigate the coffee-leaf disease which was causing havoc in the coffee estates in that colony.

The outcome was another paper read on 1st June, 1882 (Journal, Bot. xix. (1880) pp. 299-335), followed by one on a bye-product on an epiphyllous lichen, which appeared in our 'Transactions' (ser. II. Bot. ii. (1884) 87-119, pls. 18-21). It was during his work in Ceylon that he formed views on the parasitism of Fungi, which largely influenced his succeeding labours.

In 1882 he was elected Berkeley Fellow at Owens College, becoming assistant to Professor Williamson, and staying there till 1885, in which year he removed to Cooper's Hill, as Professor of Botany, in the Forestry Department of the Royal Indian Engineering College.

During the ten years he remained at Cooper's Hill, much of his most striking work was accomplished. In 1887 appeared a paper in the 'Philosophical Transactions' on the tubular swellings on the roots of *Vicia Faba*, this paper contributing some important facts in the biology of the case, proving that these nodules were of parasitic origin, and that the parasite, since known to be a bacterium, enters by the root-hairs. The subject was summed up in a luminous article in the 'Annals of Botany' then just started. The same volume also contained a joint paper by him and Mr. T. Dunlop on the origin of rhamnin, the yellow pigment of "French Berries" from *Rhamnus* by a ferment in the testa of the seed. Another paper on a ferment, this time in a lily, appeared in the following volume. A memoir on the relations

between host and parasite in certain epidemic plant diseases was published in the 'Proceedings of the Royal Society' in 1890, and led to his being selected as Croonian Lecturer in that year.

A short paper on *Craterostigma pumilum* in our 'Transactions' (Bot. v. (1899) 343-355, pls. 34, 35), while interesting for its account of the colouring-matter contained in the root, reads curiously as to the first part, where the steps are detailed by which the determination of the plant was made, showing that the brilliant investigator was not equally at home on taxonomic points. The symbiotic life of the organism known as the "Ginger-beer plant" was set out in the 'Philosophical Transactions' in 1892.

A laborious series of investigations on the Water Research Committee of the Royal Society in 1893-6, in conjunction with Professor Percy Frankland, showed Ward's powers of working out the life-history of no fewer than eighty bacterial organisms found in the river Thames, his fifth report in 1897 summing up. Bacterial subjects occupied much of his attention about this time, as shown by his "Characters in Classifying the Schizomycetes" in the 'Annals of Botany,' 1892; "Action of Light on Bacteria," Phil. Trans. 1895; "Some Thames Bacteria" and "A Violet Bacillus from the Thames" (Ann. Bot. 1898).

Whilst these researches were being carried on, Professor C. C. Babington, Professor of Botany at Cambridge, passed away, and Ward was appointed his successor, at the same time becoming professorial Fellow of Sidney Sussex College. Transferred into this more congenial atmosphere, he succeeded in giving a fresh impulse to the progress of his science in his own University. The Botanical School acquired so much importance that the University allowed a large share of the benefaction fund to the erection of a new botanical institute, which was opened by His Majesty the King in the spring of 1904.

The Uredine fungi became the dominant interest of Ward's later investigations. The Brown Rusts on Bromo Grasses were shown to be physiological species, forms morphologically identical, but showing varying powers of infection, or even of inability to attack certain species of *Bromus*. He became involved in a controversy on the mycoplasma theory, which, after long investigation, he considered he had shown to be untenable.

His principal original papers have only been briefly touched upon, but this notice cannot pass by his other contributions to botanic literature, as his translation of Sachs's 'Physiology of Plants,' 1884; 'Timber and some of its Diseases,' 1889; 'The Oak,' 1892; a revision of Laslett's 'Timber and Timber Trees,' 1894; 'Diseases of Plants,' 1889; 'Grasses,' 'Disease in Plants,' both in 1901; 'Trees,' of which three parts have appeared, 1902-6. A paper which appeared in our 'Transactions' a few years ago by one of his pupils was unobtrusively condensed and rearranged for publication by Ward.

Marshall Ward was elected Fellow of our Society 6th May,

1886, and of the Royal Society in 1888, receiving a Royal Medal in 1893, and serving a term on the Councils of both Societies. In 1897 he was elected Honorary Fellow of Christ's College, and was Sc.D. of Cambridge, and D.Sc. of Victoria University, Manchester, besides many other honorary distinctions.

He died at Torquay, as mentioned previously, and was buried at the Huntingdon Road Cemetery, Cambridge, on 3rd September, 1906, Professor Vines and Lieut.-Colonel PRAIN representing our Society. He leaves behind him the reputation of a brilliant investigator, a masterly expositor, a genial companion, a whole-hearted devotee to the work of his life. The work he accomplished and its high quality testify to the consuming enthusiasm of the man who compressed so much into little more than half-a-century of existence. [B. D. J.]

WILLIAM WATERFIELD was born at The Cloisters, Westminster, on 14th August, 1832, and went to Westminster School in 1843, was elected head into College (*i. e.*, gained a scholarship) in 1846, was Captain of the School in 1849-50, and became a "major-candidate," *i. e.*, underwent the examination necessary for his election to the University, but withdrew his name before the electors came to decide on the merits of the candidates. He so distinguished himself during the examination as to elicit the universal approbation of the electors; and the Dean of Christ Church (with whom lay the first choice) expressed his regret and disappointment that he could not secure so promising a student for Christ Church.

Mr. Waterfield, however, preferred an appointment to a Bengal Writership, and accordingly went to Haileybury, then the training college for service under the East India Company. At Haileybury he maintained the reputation he had obtained at Westminster and gained many prizes and medals for classics, mathematics, and English essays, &c., and for Sanskrit, Persian, Hindustani, Hindi, and Bengali.

He left Haileybury in 1852, being head of his Term, and went out to India, where the College of Fort William was then still in existence in Calcutta. Here he obtained medals for Oordoo, Bengalese, Hindee, Persian, and Arabic, and so distinguished himself that the Governor-General, Lord Dalhousie, presented him with his Degree of Honour in person. Mr. Waterfield was the last student to obtain the Degree of Honour, the College being abolished in 1854.

He was posted to Bengal, where he served mainly in the Revenue and Survey Department from 1852 to 1859, devoting his spare time to a study of the natural history of the tracts of country which he visited in the course of his official duty. In 1859, on the transfer to the Crown of the government of India, he was appointed First Assistant to the Accountant-General for India, a charge of great trust, for which mathematical attainments conjoined with marked capacity for business specially fitted him, and from that time until his

retirement from service in India he held successive posts under the Finance Department, in the Southern Presidencies largely; and on return from leave home in 1874 was confirmed as Accountant-General at Allahabad for the Government of what are now known as the United Provinces of Agra and Oudh. It was the writer's good fortune to be his fellow-passenger in the autumn of 1874 on the voyage to Bombay, and he never missed a fair opportunity of interesting those whose work and interests were to be bound up, for the best years of their lives at least, with India, in the history and products, and especially the flora, of that country. With the flora he was well acquainted, though the pressure of official responsibilities seems to have precluded him from making any public contribution to botanical literature; while his knowledge of the plants reared for use or ornament in gardens, differing as these necessarily do widely in the different parts of India, was as remarkable as it still, unfortunately, is exceptional. He was also a keen student of astronomy, a pursuit to which it was perhaps more easy to attract beginners than to field-botany, which, even in the Nilgiris or Himalaya, demands considerable sacrifice. Waterfield was elected a Fellow of the Linnean Society on 6th April, 1876. From 1877-1880 he was Comptroller-General in India, the highest post in the domain of finance outside the Viceroy's Council, and on leaving India finally retired from the public service in 1881. On returning to this country he settled at Starcross in Devon, and became a Justice of the Peace for that county, and engaged in local work and cultivating botanic rarities in his garden.

The writer has to thank Mr. Philip G. Waterfield for the information given above of the early career of our late Fellow.

[J. R. DRUMMOND.]

June 6th, 1907.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the Anniversary Meeting of the 24th May, 1907, were read and confirmed.

Mr. Frank Arthur Stockdale was proposed as a Fellow.

Mr. William Holmes Burrell, Mr. Iltyd Buller Pole Evans, Mr. Frederick Ambrose Gardiner, Mr. Frank Campbell McClellan, Mr. Robert Patterson, and Mr. Geoffrey Watkin Smith were elected Fellows.

The President announced that he had appointed as Vice-Presidents for the ensuing year:—Mr. Horace W. Monckton, Prof. E. B. Poulton, Lieut.-Col. Prain, and Dr. A. B. Rendle.

A telegram was despatched to Stockholm, from the meeting, to congratulate His Majesty the King of Sweden on the occasion of Their Majesties' golden wedding.

In accordance with the announcement made on the 18th April, a new subsection to Chap. II. of the Bye-Laws was read a third time from the Chair, and, by Ballot, approved by 24 votes in favour, with 1 against, and 2 abstentions.

The PRESIDENT invited Dr. W. CARRUTHERS, F.R.S., the representative of the Society at the recent Linnean celebrations in Sweden, to make a report, upon which Dr. Carruthers gave an account of the proceedings, beginning on the 21st May at Lund, where the Rector of the University received the visitors, and, after a lunch, the excursion by special train to Råshult, the return to Elmhult for supper, the further journey south to Hesselholm to meet the train from Malmö, and the subsequent night journey



Obverse and Reverse of the special Linnean Gold Medal; the Reverse had the following inscription on the space in continuation of that round the edge:—
 "Univ. Regiæ Upsaliensi dat amicitiae pignus, X Kal. Jun. MCMVII."

to Stockholm and Uppsala. Next he described a special journey to Linné's Hammarby with his travelling companion Mr. (now Dr.) B. Daydon Jackson, and Lieut.-Colonel Prain, F.R.S. The events of the two following days were then recounted—the students' greeting at the railway station on the morning of the 23rd May; the celebration in the Aula of the University, where he presented the special Linnean Gold Medal and the Society's Address; next the reception of the foreign delegates by the Prince Regent, the decoration of Prof. Poulton and the General Secretary by the Prince on behalf of the King with the insignia of the Polar Star; the Students' Concert in the afternoon, in the Botanic Garden; and the Rector's dinner, at which only three toasts were proposed, one being that of "The Linnean Society," to which the representative responded, and a reception afterwards in the University. Friday 24th opened with a salute of 21 guns from the castle; the great bell of the Cathedral rang from 8 till 8.15; at noon the procession from the University started to the Cathedral, and he

described the scene of the Promotion, the Promotor in each case being the Dean of his respective Faculty: Divinity, Law, Medicine, and Philosophy. Mr. F. Darwin, the General Secretary, and himself, Fellows of the Society, had the honorary degree of Doctor of Philosophy conferred upon them. Artillery was fired during the granting of the degrees, and soon after 3.0 P.M. the audience dispersed, the new doctors to gather on the steps of the University to receive the homage of the students with their banners, president, and chorus. The dinner was in the Aula, followed by a students' ball, which was attended by the General Secretary. Early on Saturday the delegates left for Stockholm, but the special train was late in reaching Stockholm, too late to permit of the Bergielund Botanic Garden being visited. At 2.0 P.M. the event of the day took place at the Kungl. Musikaliska Akademi, where Count Mörner, President of the Kungl. Svenska Vetenskaps Akademi, after eulogising Linnæus, spoke in English and announced that the Bicentenary Medal of the Academy had been awarded to Sir Joseph Hooker. A dinner at Hasselbacken closed the day's doings, and a garden party at the Palace the following day put the seal on the festivities. No one who was present during that momentous week would ever forget it, but must always look back upon it as a most delightful episode, to be treasured in memory to the end of life.

The GENERAL SECRETARY added a few supplementary remarks, pointing out on a map on the screen the position of the places named, and then showing lantern-slides of Lund University, the obelisk at Råshult, the Cathedral at Uppsala (three views), and a students' procession in front of Uppsala University.

Mr. G. C. DRUCE, F.L.S., showed a specimen of *Orobanche Ritro* from the Channel Islands, which had been named var. *hypochaeroides* by Günther von Beck; also fresh specimens of *Bromus interruptus* from N.W. Northants, and *Orchis Simia*, gathered the previous day.

Mr. G. GLOVER exhibited a small portrait of William Kirby, the entomologist, painted on Academy board. The Rev. T. R. R. Stebbing recalled the early history of the celebrated Introduction to Entomology from the pens of "Kirby and Spence."

The following papers were read and discussed:—

Prof. A. DENDY, D.Sc., Sec.L.S., and E. HINDLE.—"Some Additions to our Knowledge of the New Zealand Holothurians."

Prof. W. A. HASWELL, F.L.S.—"Australasian Polyclads." (Communicated by Prof. A. DENDY, D.Sc., Sec.L.S.)

Mr. C. TATE REGAN.—"Marine Fishes collected by Mr. J. Stanley Gardiner in the Indian Ocean."

Prof. NEUMANN.—"Ixodidæ collected in the same Expedition." (Communicated by the Zoological Secretary.)

RECEPTION by the PRESIDENT and COUNCIL in the Rooms of the Society, Burlington House, on Friday, 7th June, 1907, from 8.30 to 11.0 P.M., in honour of the 200th Anniversary of the Birth of LINNÆUS, on the 13/23 May, 1707.

The guests were received by the President, Professor W. A. Herdman, D.Sc., F.R.S., and Mrs. Herdman, in the Library; about three hundred were present, nearly one-half being ladies. Amongst those present were His Excellency Count Wrangel, the Swedish Minister, other members of the Legation, and several Swedish visitors. Sir Thomas Elliott, K.C.B., Secretary to the Board of Agriculture and Fisheries; Sir Archibald Geikie, President of the Geological Society and Secretary of the Royal Society; Sir William Ramsay, K.C.B., President of the Chemical Society; Sir John Murray, K.C.B., were also present, and other eminent men of science.

A special feature of the exhibition was a display of manuscripts, books, personal relics, medals, &c., of the great Swedish Naturalist, which belong to the Society; and the beautiful Inlander medallion was surrounded by a wreath of laurel (which had been used in the conferment of the degree of Phil.Dr. at the recent celebrations at Uppsala) formed of leaves gathered from a bay-tree planted by Linnæus himself, and lent by the General Secretary; whilst the Swedish flag formed a background to the small model of Kjellberg's statue of Linnæus in the Library.

In the Library the following were shown:—

1. *From the LINNEAN RELICS in the possession of the LINNEAN SOCIETY OF LONDON.*

- (a) Selection of drawers containing Fishes, Lepidoptera, Coleoptera, Shells, &c.
- (b) Portrait of Linnæus by C. F. Inlander; copy of the same in alabaster; Medals struck in his honour, including the Linnean Society's Annual award, and the Bicentenary Medal of the Royal Swedish Academy of Sciences.

Photographs of his father, and his only brother Samuel; Wood blocks formerly belonging to Linnæus, engraved for the elder Rudbeck.

- (c) Dried Plants (*Linnæa* and *Browallia*) from the Linnean Herbarium to show the method of mounting and naming; the number at foot refers to the same number in the 'Species Plantarum,' ed. 1.
- (d) Letters from LINNÆUS to JOHN ELLIS, F.R.S., and in return.
- (e) Interleaved volumes.—1st and 2nd editions of the 'Species Plantarum,' with copious manuscript additions;

also of 'Cent. I. Plantarum,' showing the alterations in naming *Dianthus superbus* and its final shape in the 'Amenitates Academicæ,' iv. p. 272.

- (f) Manuscripts, including 'Iter lapponicum,' his Autobiography, 'Iter dalecarlicum,' 'Spolia botanica' of 1729; works on assaying, 'Systema morborum,' walking-stick, pencil-case, seals, &c.
- (g) Manuscript list of his Herbarium in 1755, with a memoir on the same, prepared for the 200th anniversary of Linnæus's birth. Books showing additional notes.
- (h) Letters written by LINNÆUS (a) to EHRET, the botanic draughtsman, and (b) to HALLER, the latter a short but interesting letter which healed the breach between the two. (Latter lent by the General Secretary.)
- (i) Carved rhinoceros horn, mentioned in 'Amenitates Academicæ,' iv. p. 234, and figured in the life of Sir J. E. Smith, ii. p. 230.

2. Dr. TEMPEST ANDERSON, F.L.S.

Photographs showing growth of vegetation since the eruption of 1902 in St. Vincent.

3. Dr. C. W. ANDREWS, F.R.S.

Model of the skull and mandible of *Prozeuglodon atrox*, Andrews, one of the forms intermediate between the Creodont Carnivora and the Zeuglodonts. The three-rooted premolars and molars and the comparatively forward situation of the nostrils are the chief primitive characters. Collected by Mr. H. J. L. Beadnell in the Middle Eocene beds of the Fayum, Egypt.

4. Miss MARGARET BENSON, D.Sc., F.L.S., and Prof. F. W. OLIVER, F.R.S., F.L.S.

Preparations of the Palæozoic Seeds, *Lagenostoma ovoides* and *Physostoma elegans*, showing bodies presumed to be Spermatozoids.

5. Mr. A. D. DARBISHIRE, M.A.

Specimens showing the result of crossing different varieties of the culinary Pea, *Pisum sativum*, as illustrative of Mendelian phenomena of inheritance. During the evening some actual cross-fertilizations were made.

6. Prof. A. DENDY, D.Sc., Sec.L.S.

- (a) Microscopic preparations of the Egg-shell of *Ooperipatus oviparus*, Dendy, showing the sculptured pattern.
- (b) Microscopic preparation of the Integument of *Ooperipatus viridimaculatus*, Dendy.
- (c) Microscopic preparations of Fossil Sponge-Spicules from the Oamaru Siliceous Earth of New Zealand. Prepared by H. Grayson.

- (d) Diagram of the Evolution of Tetraxonid Siliceous Sponge-Spicules.
7. Prof. J. BRETLAND FARMER, F.R.S., F.L.S.
Preparations showing the phenomena of Apogamy, the asexual production by budding of new plants from a prothallium.
 8. The President, Prof. HERDMAN, D.Sc., F.R.S., F.L.S.
(a) Photographs and specimens illustrating the Oyster Fisheries of Ceylon, and (b) A series of Plankton gatherings illustrating both quantitative and qualitative variation, according to locality, date, and net used.
 9. Mr. FREDERICK KEEBLE, M.A.
The infecting organism of *Convoluta roscoffensis*.
 10. Mr. FRANCIS J. LEWIS, F.L.S.
Plant-remains, Seeds, Leaves, &c. from the Peat.
 11. Prof. F. W. OLIVER, D.Sc., F.R.S., F.L.S.
Charts and Photographs to illustrate a stage in the development of a Salt-Marsh. (From the Erquy Station.)
 12. Mr. J. A. WEALE.
Photographs of transverse sections of *Castanea vesca* and *Aristolochia Sipho*.

Lobby.

13. Mrs. D. H. SCOTT, F.L.S.
Animated photographs of Plant-life shown by the Kammatograph.

East Gallery.

14. Copies of addresses sent by (a) The Linnean Society of London, and (b) The Royal Society, to the Royal University of Uppsala and The Royal Swedish Academy of Sciences, Stockholm, respectively.

North Gallery.

15. Prof. J. P. HILL, D.Sc., F.L.S.
Photographs and drawings illustrating the development and life-history of the Native Cat (*Dasyurus viverrinus*), one of the pouched mammals or Marsupialia of Australia.
The photographs and drawings exhibited represented (1) a practically complete series of developmental stages beginning in the unsegmented egg and ending in the newly-born young, and (2) the subsequent growth of the young in the pouch during a period of three months.
Attention was directed to the microphotographs of segmenting eggs, and to the drawings showing the recently born young just before and just after the attachment to the teat.

South Gallery.

16. Mr. J. STANLEY GARDINER, M.A., F.L.S.
Photographs taken during his recent voyage in the Indian Ocean in H.M.S. 'Sealark,' for the Percy Sladen Trust,

In the **Meeting Room** four lectures and lantern-demonstrations were delivered, beginning at 9.0, when Professor E. B. POULTON, F.R.S., gave a brief account, illustrated with many slides, on Dr. Burchell and his travels in South Africa.

WILLIAM JOHN BURCHELL was born on July 23rd, 1781 or 1782, the eldest son of Matthew Burchell, proprietor of the celebrated Nursery Gardens at Fulham. He received a fine education at the Rayleigh House Academy, Mitcham. In 1805 Burchell sailed for St. Helena, and landed on the island December 13th. In 1807 a young lady, to whom Burchell had been engaged in Fulham, set out in order to join him in the island: she landed April 17th, 1808, but refused to marry him. There can be no doubt that the bitter disappointment influenced Burchell's character and whole career. After a stormy and uncomfortable sojourn in St. Helena he sailed for Cape Town, landing November 26th, 1810. This point marks the beginning of his great work 'Travels in the Interior of Southern Africa,' which comes to an abrupt conclusion on August 3rd, 1812, the day on which he brought to an end his first visit to Litakun, the capital of the Bachapin nation. Burchell had intended to travel N.W. and reach the W. coast, but was compelled by the fears of his men to turn back on October 27th, 1812, after reaching furthest north at the "Maadji Mountain," in British Bechuanaland, on nearly the same latitude as Maretsani siding on the railway and as Johannesburg. At this part of his journey, during which great hardships were endured, Burchell discovered the so-called "White Rhinoceros," afterwards described by him and named *R. simus*. Burchell returned S. on a track to the W. of his former route, which he rejoined near Kuruman Station, thence retracing his steps to Klaarwater (the existing Griquatown). He then struck S.E. to the mouth of the Great Fish River, which he left October 25th, 1813, for a leisurely journey westward along the S. coast to Cape Town. He arrived about the middle of April, 1815; we know that on the 15th of the following September he was at St. Helena on his voyage home. During the next ten years Burchell lived with his family at Churchfield House, Fulham, naming and arranging his great botanical and zoological collections and writing his classical work, of which the first volume was published in 1822, the second in 1824. On March 10th, 1825, he again started for a great journey, this time in the New World. On the way to Rio he collected for two months near Lisbon, for a day in Madeira and two in Tenerife. Burchell reached Rio, January 18th, 1825, and remained until September 10th, 1826, making two excursions of about a month each into Minas Geraes and the Organ Mountains. Finally, on September 10th, he sailed for Santos and began his great three-years' journey northward to Pará, through the heart of Eastern Brazil. Burchell's father died on July 12th, 1828, but such was the difficulty in communicating with him that he did not know of his loss until October 15th, 1829, four months after his arrival at

Pará, on June 10th. He sailed from Pará on February 10th, 1830, arriving at Fulham March 25th.

The Honorary Degree of D.C.L. was conferred upon Burchell by the University of Oxford on May 8th, 1834. Although this great naturalist had some intimate friends he lived a secluded life, and tended as years went on to withdraw himself more and more from his scientific colleagues, and indeed from all except the members of his family. During the long period which intervened between his return from Brazil in 1830 and his tragic death by his own hand on March 23rd, 1863, at the great age of 81 or 82, Burchell expended immense labour on the arrangement and labelling of his collections. He travelled in England and on the Continent from time to time, making sketches and doing a little collecting. His great Herbarium with a splendid set of manuscript notes is at Kew; his fine collection of insects, and as much of his other zoological collections as remained in 1863, at Oxford. Something has been done to publish his wonderful records, and when the whole is before the world it will be realised that he was one of the greatest of travellers and observers.

The lecturer desired to thank Sir Joseph Hooker for his constant kindness and help in all the earlier parts of his investigations into the history of this great man. In consequence of his own lecture in Cape Town (*Rep. Brit. and S. Afr. Assoc.* 1905, vol. iii. pp. 57-110), August 17th, 1905, Professor Poulton was brought into communication with a grand-nephew of the great explorer, Mr. Francis Augustus Burchell, of the Rhodes University College, Grahamstown, and both he and the Rev. Evan Davies, of Springs, Transvaal, had been extremely kind in permitting the study of drawings, letters, journals, and other records.

The second address was by the PRESIDENT (Prof. W. A. HERDMAN, F.R.S.), who said :—

Before passing to the Ceylon Pearl Fisheries, upon which it has been arranged that I am to make some remarks and to show you some lantern illustrations, I desire to say a very few words in regard to the occasion and the manner of our gathering here to-night.

Briefly it is in honour of Linnæus and in commemoration of his work. The celebration of the 200th birthday of our eponymous hero, the illustrious Swedish naturalist, Carl von Linné, has been made the occasion of congratulatory meetings in Sweden and elsewhere throughout the civilized world—wherever the Natural Sciences are cultivated and the debt of the Naturalist to Linnæus is gratefully acknowledged.

On our anniversary meeting, a fortnight ago, held on the reputed birthday of Linnæus, the occasion was formally dealt with in the Presidential Address, and a congratulatory telegram was despatched from our meeting to the University of Upsala.

This Society was represented at the celebrations in Upsala and Stockholm by our Past-President, Dr. William Carruthers, as the official delegate, accompanied by our General Secretary, Dr. Daydon

Jackson. Dr. Carruthers conveyed our formal addresses to the University and the Academy of Sciences, and also a copy of our Linnean Gold Medal, specially struck for the occasion and presented to the University in which Linnæus was a professor.

These more formal celebrations of the anniversary are now past; and, moreover, it is recognized that our very existence in this Society is in honour of Linnæus, and that all our corporate life and work may be said to be devoted to the exposition and the further advancement of the undying labours of the founder of the sciences of Descriptive Botany and Zoology. Consequently, it has been decided by our Council that the present further commemoration of this noteworthy year in the annals of our own and all kindred societies should take the informal shape of a social gathering, and that—apart from this brief statement, which I have been requested to make—our time together this evening should be devoted to profitable conversation, to the inspection of the many Linnean and other scientific exhibits upstairs, and to the short demonstrations which will be given from time to time in this Meeting Room; it being understood that all that we do, and our very presence here this evening, is in honour of Linnæus and in commemoration of the foundations he laid in the Sciences we love.

The PRESIDENT then proceeded to show some illustrations of the celebrated Pearl Fisheries of Ceylon—probably the most important, the most famous, and the most ancient of pearl fisheries in the world. Photographic slides were exhibited showing the location of the Pearl Fisheries in the Gulf of Manaar, the characteristic scenery of the coasts, and the manner in which a temporary town of perhaps 40,000 inhabitants and miles of streets was run up in a few days at Marichchukadde, near the mouth of the Modragam river. At the conclusion of the fishery this great population melts away again in a few hours, and the site of “Pearl town” becomes once more a solitary sandy waste.

The vessels composing the fishing fleet were then described and illustrated, and the divers and their habits and mode of life were shown. These men are mainly Indians from the Adam’s Bridge district and Arabs from the Persian Gulf. No diving suits or mechanical appliances are used, and the divers rarely stay down more than a minute and a half and do not dive in water deeper than about 9 fathoms.

The pearl-oysters (*Margaritifera vulgaris*) were then shown, and their life-history from the egg to the adult was briefly traced. The enormous numbers of the “spat” and the possibilities of wholesale destruction at various stages by organic enemies and inorganic agencies was shown to afford man an opportunity of averting calamity to the fisheries by transplanting, cultching, and other measures of artificial cultivation.

The structure of Mother-of-pearl and of the Orient pearl was illustrated; and the question of pearl-production, and its relation

in the Ceylon pearl-oyster to the presence of larval Cestodes of the genus *Tetrarhynchus*, was briefly discussed: photographs of different stages in the process were shown.

Finally, photographs were shown illustrating some of the ancient customs of the fishery, which have probably existed since pre-historic times with little or no change; and some of the ancient temples and buried cities of the north of Ceylon, which date back to the same early times and which were erected by native princes who obtained their pearls from the Gulf of Manaar centuries before the Christian era.

Lieut.-Colonel PRAIN, F.R.S., V.P.L.S., then delivered the third of the series, epitomised thus:—Botanical studies, if purely systematic, though perhaps uninviting to outsiders, are engrossing to the initiated. Those other botanical studies that are termed, somewhat pragmatically, scientific are as interesting to their votaries as they are varied in themselves. We are not now, however, concerned with either, but with botanical studies of still another class, those economic ones that appear often as uninviting to the systematic worker as systematic studies appear to the botanist whose "science" excludes taxonomy. The economic botanist, humble-minded soul, cannot indulge in airs and graces; his work can only go on with the help of his scientific colleagues; it can only begin if his taxonomic colleagues have provided him with a sure foundation. Humility is not the only virtue he has to cultivate. He must be patient too. The natural law which he finds least irregular in its application is that our knowledge of a vegetable product varies inversely with its importance. He cannot, like the taxonomist, decline to deal with a subject because the material before him is incomplete; he often has to be content with what he can get, and is sometimes driven to make the most of rather scrappy samples.

In general, however, the human interest of his studies relieves his work of the monotony that might be anticipated, and the by-paths into which he is enticed often lead him to unexpected places and result in reciprocal greetings with workers whose field of study seems at first sight foreign to botany.

A few stray instances taken from experience gained in the course of Indian economic enquiries may serve to indicate the interest of such collateral results. A study of the distribution of the races of Wheat in Eastern India shows that, although it is impossible to hope for a good crop in any part of Lower Bengal in any year, on account of "rust," the cultivation of this cereal, so widely grown in Upper India, does not stop short when the western margin of the unsuitable region is reached, but extends in a narrow belt through Central into Eastern Bengal. We are thus brought in contact with the history of the progress of the Mogul power eastward. The wheat-consuming conquerors, not content with the rice which is the staple food of those they overcame, must needs persist in growing their favourite grain.

If we consider the distribution of the races of Mustard cultivated in the same region, we find that our familiar *Brassica* is known in Behar as it is elsewhere in Upper India as 'Sarson.' In the Lower Gangetic Plain, where the language is Bengali, the corresponding word is 'Sarisha.' But while, as a matter of linguistics, the two names are identical, we find that the Hindu 'Sarson' and the Bengali 'Sarisha' are entirely distinct plants, and the incidence of the two names never varies in either region. The striking feature in this case is that both plants are equally widely grown and equally well known in the two areas, but that in Bengal the Hindu 'Sarson' is termed 'Dhepo,' in Behar the Bengali 'Sarisha' is termed 'Latni.' We learn then that, though linguistically two names may be the same and though the general significance of the two may be similar, their specific application may be quite distinct.

In North-Eastern Bengal one finds that, while there as elsewhere in this alluvial rice-swamp the staple monsoon field-crop is almost necessarily *Oryza sativa*, in the winter months the people grow as garden rather than as field crops a number of plants unknown in cultivation elsewhere in India. These include among others a chrysanthemum yielding an oil-seed; a cabbage; mustard; a mallow, elsewhere a field-weed, here a deliberately cultivated mucilaginous vegetable; a form of China-grass, grown for its fibre, so as to supply strong ropes for the haulage of country boats against the stream in the summer floods. The climate even in winter is not particularly well suited for any of these, and the conclusion to which one is irresistibly led is that we see here, even if the people themselves be unaware of it, a parallel to the efforts of European denizens in India to grow, in the winter months, wallflowers, stocks, violets, and the like, not because these plants can be grown easily or grown well, but because they are associated with "home." Hindu as to faith, Bengali in speech, it would surprise these people if it were suggested that racially they are entirely unlike their Bengali neighbours south and west of the Ganges. But when it is realized that the winter garden crops in question are Chinese and not Indian ones, the idea suggests itself that the people who grow them also came into India across the north-eastern frontiers. Here, then, the economic botanist finds himself in contact with the ethnologist, and in this particular instance can apply evidence confirmatory of a hypothesis suggested by the facts obtained from head-measurements.

These are but instances to show that economic botanical studies, apart from their direct interest, which in itself may be sufficiently fascinating, particularly when the material available admits of their being carried to completion, may lead to results that are of interest to the historian, the scholar, the ethnologist. But before leaving the subject it may be permissible to allude to an instance where a botanical study—this time, however, scientific, and not economic—seems to supply food for thought to those interested in folk-lore.

In the garden of a native gentleman near Calcutta occurs a

Ficus which exhibits the peculiarity of having all its leaves modified into hypoascidial cups. The alteration of leaves into cups is not an uncommon phenomenon, but it rarely extends to all the leaves of an individual plant, and in no other known plant are the leaves hypoascidial. A sustained enquiry failed to show whence this particular tree had originally come or to indicate that another tree with foliage of this kind occurs elsewhere. After some trouble two rooted cuttings of the original tree were established in the nurseries of the Royal Botanic Garden at Calcutta. But, though nothing of the kind had ever been seen or heard of elsewhere, the rooted cuttings in question, which were a source of great interest to the native gardeners of the establishment, at once evoked a myth of the most circumstantial character, in which an incident in the life of Rama was made to account for the appearance of these supernatural cups. Nor did the matter end here. When, a couple of seasons later, one of the two cuttings had become sufficiently large to admit of its being planted out in the public part of the garden, where it again excited great interest among a wider and often much more highly educated class, another myth as circumstantial as the first was evolved to explain the occurrence and shape of the leaves. But the incident and the explanation were altogether different, and the supernatural power required to account for the existence of the cups was attributed to Krishna, not to Rama. The inference from the existence of a myth in connection with a natural phenomenon, that therefore the phenomenon which the myth endeavours to explain has been long known, is in this case precluded; while the fact that in the instance under review not one myth only, but two, were promptly forthcoming, seems to show that, given a child-like and imaginative people, a phenomenon only requires to be sufficiently striking to ensure the impromptu evolution of a mythical explanation.

The last lecture was delivered by Mr. FRANCIS J. LEWIS, F.L.S., on the Plant-remains in British Peat-mosses; he said:—

I have been asked to say a few words this evening on the succession of vegetation in the peat of Britain; a deposit of some interest, inasmuch as many peat-bogs contain, buried in their depths, a complete story of the vegetation which has existed over such spots since the Glacial period.

The interest of a peat-moss depends upon the fact that it shows definite stratification. A few slides will make this evident. If the stream channels of many mosses are walked through, the stems and roots of large trees are often seen exposed as the bank is gradually cut back by the stream at its base.

When the peat is deep and the stream has cut its way down to the underlying soil, the tree-roots and stems are seen to occur in a definite layer—sometimes one, more frequently two, and occasionally three such forest layers can be recognized, separated by thick beds of peat quite free from tree-remains.

Two such forest zones can be recognized in Britain.

SLIDES EXHIBITED.

1. The Upper Forest. Caithness-Sutherland border.
2. Upper Forest exposed by denudation. Cairngorms.
3. Upper Forest. Kells.

The arctic zone between the forest beds.

4. Arctic zone. Merrick-Kells.

The sequence in the Southern Uplands.

5. Sequence in Merrick-Kells.

Turning now to a district far north of this, that was examined two years later, the same features appear.

6. Sequence in Shetland.

When Highland areas are examined the upper beds remain in general characters the same, but the beds below the intercalated arctic are missing.

7. Sequence of Spey-Findhorn.
8. The areas examined. Map.

The meaning of the missing basal beds in Highlands.

9. Ways in which peat may be removed. Coire Bog torrent beds.
10. Photo of actual example.
11. Merrick-Kells, general view.
12. Shetland. Burn of Dale.
13. Cape Wrath district.
14. The Lews mosses.
15. The denudation of peat universal, except in boulder clay-basins in lowlands. Cross Fell peat-bogs.
16. N. Uist denudation.
- 16 a. Denudation in Lews.
17. General view of Cross Fell deposits.
18. Peat running up to limestone outcrop. Cross Fell.
19. The Upper Forest. Cross Fell.
20. The altitudinal limits of an arctic alpine flora and forest vegetation at successive stages since the Glacial period.
21. Doubling of pine zone (Upper Forest). Spey-Findhorn watershed.
22. Stonechrubie, Assynt. No arctic plants at the base.
23. Rannoch Moor. Presence of arctic plants at base and doubling of Upper Forest.
24. A section on banks of Sma Lochs.
25. Peat coming up to base of limestone.
26. The character of the zones—*Empetrum*.
27. Moraines on which southern upland peat rests. The glacial succession.

June 20th, 1907.

Prof. W. A. HERDMAN, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 6th June, 1907, were read and confirmed.

Mr. Geoffrey Watkin Smith, Mr. Montagu Austin Phillips, and Mr. Frederick Ambrose Gardiner were admitted Fellows.

Mr. Walter Henry Baker, Mr. Reginald Evelyn Child Beale, and Dr. John Tanner were proposed as Fellows.

Mr. Ralph Sneyd Pearson was elected a Fellow.

The President read a letter congratulating Sir J. D. HOOKER on his sixty-five years of Fellowship of the Linnean Society, and the approaching completion of his ninetieth year, which was signed by the Fellows present, for transmission to the veteran botanist.

An acknowledgment from the principal secretary of H.M. the King of Sweden, in reply to the telegram sent on the 6th June on the occasion of his golden wedding, was read by the General Secretary.

The Rev. T. R. R. STEBBING, F.R.S., F.L.S., referred to the recent Reception (7th June) and hoped that the lectures delivered then would be printed in the 'Proceedings'; a reply was given by the President, and further remarks made by Mr. J. C. Shenstone.

Mr. W. C. WORSDELL, F.L.S., exhibited some remarkable cases of carpellody of the inner stamens of *Papaver commutatum*, selected from a bed of plants at Kew so labelled, with one specimen of *P. orientale* showing the same peculiarity of separate carpels surrounding the capsule.

Dr. Scott and Mr. J. C. Shenstone spoke on this exhibit.

The GENERAL SECRETARY exhibited two photographs he had received that morning from Prof. VAN LEERSUM of Leiden, of two pages from the audience book of Herman Boerhaave, showing the signature of Carl Linnæus on each, with many other signatures of men who afterwards became famous.

Dr. A. B. Rendle mentioned the celebrated letter of Boerhaave introducing Linnæus to Sloane, which was now on view at the British Museum (Natural History).

The following papers were read and discussed:—

The late Dr. MAXWELL T. MASTERS, F.R.S., F.L.S.—“On the Distribution of Conifers in China and neighbouring Countries.”

Mr. J. STANLEY GARDINER, M.A., F.L.S.—“Introduction, part II., of the ‘Sealark’ Expedition.”

- Mr. E. E. GREEN.—“Coccidæ.” (Communicated by Mr. J. STANLEY GARDINER, M.A., F.L.S.)
- Herr M. FOSLIE.—“Lithothamnium.” (Communicated by the same.)
- Mr. L. A. BORRADAILE, M.A.—“Stomatopoda.” (Communicated by Dr. W. T. CALMAN, F.L.S.)
- Mr. A. W. WATERS, F.L.S.—“Species and Ovicells of *Tubucellaria*.”
- Mr. CLEMENT REID, F.R.S., F.L.S., & Mrs. REID.—“On the Pre-Glacial Flora of Britain.”
- Dr. W. E. HOYLE.—“Cephalopoda of the Sudan.” (Communicated by the President.)
- Mr. E. A. NEWELL ARNER, M.A., F.L.S.—“Triassic Species of *Zamites* and *Pterophyllum*.”
- Messrs. E. G. BAKER, F.L.S., S. L. MOORE, F.L.S., and A. B. RENDLE, M.A., D.Sc., F.L.S.—“Descriptions of Plants from Mount Ruwenzori.”
- Dr. F. E. FRITSCH, F.L.S.—“The Anatomy of the Julianiaceæ.”
- Mr. G. S. WEST, F.L.S.—“On certain critical Freshwater Algaæ.”
- Dr. R. NORRIS WOLFENDEN, F.L.S.—“Report on the Results obtained during the cruise of the Yacht ‘Silver Belle.’”
- Mr. W. M. TATTERSALL.—“Amphipoda.” (Communicated by Rev. T. R. R. STEBBING, F.R.S., F.L.S.)
- Mr. G. P. FARRAN.—“*Pyrosoma spinosum*.” (Communicated by Dr. R. A. WOLFENDEN, F.L.S.)
- Messrs. E. W. L. HOLT & L. BYRNE.—“Rare or little-known Fishes taken by the ‘Silver Belle.’” (Communicated by Dr. A. GÜNTHER, F.R.S., F.L.S.)
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ABSTRACTS.

I.

A Note on *Siegesbeckia orientalis*.

By the Rev. H. PUREFOY FITZGERALD, F.L.S.

[Read 6th December, 1906.]

My chief object in sending the exhibit and note of *Siegesbeckia* is not to convey any fresh information but to gain it, and to invite evidence of its medicinal virtues from any who are acquainted with it.

Last spring, my friend M. Sers from Réunion supplied me with seed, asking whether I would try and raise it in this country; he also sent some to Kew Gardens, and a large crop has been grown near San Francisco for experimental purposes. M. Sers tells me that the natives in Réunion make very great use of the plant for all kinds of skin diseases; it is there known by the name *Guerit-vite* (the quick-cure). He tells me also that he has seen a dog, which was so bad with mange that it was ordered to be killed, cured in three weeks by being washed with water in which this plant had been boiled. *Siegesbeckia orientalis* is a native of India, but Lieut.-Col. Prain, the Director of Kew Gardens, tells me he has never heard of its being used for any purpose in India, and this is confirmed by Sir George Watt, the authority on Indian economic plants.

In the 2nd vol. of the 'Pharmacographia Indica' (Dymock, Warden & Hooper) there is a short account of some of the uses to which the plant has been applied in the islands of Mauritius and Réunion, and it is further stated that it appears to have been known for a long time in China as a remedy for ague, rheumatism, and renal colic.

The account further states:—"In Réunion it (*Siegesbeckia orientalis*) has a considerable local reputation as a sialagogue (exciting saliva), vulnerary, tonic, aperient and depurative; it is an ingredient in Perichon's *Sirap dépuratif végétal*, which is used as a remedy in scrofulous affections. The juice of the fresh herb is used as a dressing for wounds, over which, as it dries, it leaves a varnish-like coating. A decoction of the leaves and young shoots is used as a lotion for ulcers and parasitic skin diseases."

Undoubtedly, then, in Réunion the plant is largely used for various purposes, and it seems likely that, if it retains its peculiar virtues when grown in other countries, it may turn out to be a plant of much value.

The whole of my crop has been sent to a skin hospital, where it is being experimented with in various ways, but sufficient time has not yet elapsed for any statements to be made.

I have supplied a decoction to a woman who has for years suffered from an extremely irritable sort of erysipelas, and she has found considerable relief by using it.

Siegesbeckia orientalis is an erect, branched annual herb, one of the Compositæ, growing about 3 feet high, bearing opposite, broadly triangular, coarsely toothed leaves. The flowers are insignificant, yellow in colour, the ray florets strap-shaped and pistil-bearing, the disk florets being tubular and perfect. It is quite hardy and bears seeds abundantly.

The bitter principle of the plant was discovered in 1885 by M. Auffray, and named *Darutynie*; a specimen of the white crystalline scales was shown in the Indian and Colonial Exhibition, London, 1886 ('Pharmacographia Indica').

I should be glad if this note brings forth any further information from the Fellows of this Society who have come across it and have seen it used for any specific purpose.

Lieut.-Col. Prain, Director of Kew, has very kindly lent me the dried specimens and the painting; the latter will probably be of more use than the former, in showing the main features of the plant.

II.

The Ornamentation of the Frog Tadpole (*Rana temporaria*).

By NINA F. LAYARD, F.L.S.

[Read 7th March, 1907.]

WHEN the young tadpole frees itself from its jelly covering it is entirely black, but by the time it is ten days old, or possibly before, gold spots begin to appear sparsely sprinkled over the dusky skin. Very rapid changes in coloration then begin to take place, and the following notes are from a daily diary kept while these appearances were being carefully observed.

On the tenth day after the tadpole had broken away from its envelope, a thin sprinkling of gold spots was observed. At first the spots are disposed singly and in no apparent order, except that on the upper part of the ridge of the tail they form a more or less regular line. There were more spots on the upper than on under part of the tadpole, and a few, perhaps three or four, irregularly scattered over the eye.

On the eleventh day the spots had increased in number, and by the twelfth were alternately arranged in two lines on the ridge of the tail, and were thickly sprinkled over the eye. On the thirteenth and fourteenth days the only noticeable change was a slight yellowness about the nose. Two days afterwards, when the tadpole was sixteen days old, a sudden and curious change was observed in the eye. The spots had cleared away from the centre, and now formed a golden iris, arranged in perfect order, though a few were still sprinkled over the ball outside the iris. At the same time, the lines of spots on the ridge of the tail had broken up into groups composed of three or four

spots each. By the seventeenth day the skin of the tadpole presented a very beautiful appearance under the microscope. On a black background were thickly sprinkled groups of golden spots, strangely resembling a midnight sky with its groups of starry constellations.

Choosing a portion of the skin to which I could be guided by the junction of the tail with the body, I made a map of a few groups that were specially defined, but they had so altered their positions during the night, that I could recognize none of them on the following day. Meanwhile the tail had assumed a very elegant leaf-like shape, of a pale brownish hue, fretted with spots of darker brown. On the twentieth day I again made a map of the gold spots as they appeared on the ridge of the tail at 12 P.M., but by 20 minutes to eleven on the following day it was impossible to identify any of the groups. On May the 9th, which was the twenty-sixth day, I made a drawing of some spots which were seen on the eye outside the iris, and although the next day the groups could be recognized, certain changes had begun to take place. Above and below the lowest pair of spots gold bars had appeared, and a triangular gold blotch at the left had disappeared.

The twenty-third day showed constant alterations in the disposition of the groups; and by the twenty-fourth day all the spots distributed over the body, from being circular had in one night become starry, or perhaps they would now be more accurately described as "rosettes," such as are seen on the flanks of the leopard, but golden instead of black. At this time also, the uniform blackness of the underlying skin gave place to a yellowish-brown about the nose and surrounding the eyes; and four days later the whole of this portion, which comprehends almost half the body of the tadpole, had turned to burnished gold, spotted with black, while the rest of the body remained black, but literally crusted over with gold spangles. A black mark shaped like a spear-head now appeared on the elevated ridge between the eyes, and the tail became reddish in the centre, and speckled with red and black spots.

By the thirtieth day the frog-tadpole had perhaps attained its highest degree of perfection as regards ornamentation, and although it went through many subsequent changes, all beautiful in their way, I will conclude my notes with a description of it at this age, when I think it could hardly be surpassed in brilliancy of decoration by any other creature.

During the three days which had elapsed since it was last sketched, several changes had taken place. It was still more thickly spangled with gold, and a second fainter mark had appeared in advance of the spear-head marking between the eyes. Around the spear-mark spots of a brilliant turquoise-blue had grouped themselves, and the effect of these spots, surrounded as they were by gold, was very jewel-like and striking. Finally, the tail was very transparent, only slightly speckled, and frilled near the end. It is perhaps impossible to exaggerate the splendour of

a frog-tadpole at the age of one month. As this tadpole unfortunately died the day after the last drawing was made, I have wondered whether the blue spots were possibly the result of an unhealthy condition, but I have not had the opportunity of repeating the observations.

Note.—In Miss Hinckley's "Notes on the Development of *Rana sylvatica*," which appeared in the 'Proceedings' of the Boston Natural History Society, she mentions the continual change of colour taking place in the skin of the frog. So rapid were these changes, that she found it almost impossible to secure a correct representation. She found that within fifteen minutes the frog, if placed in a glass on white paper, would turn from the ordinary shade of brown to light ashy fawn.

Schnetzler believed that "the privation of light diminished and stopped the formation of the colouring matter of the skin," and according to his experiments frogs reared in green glasses remained very black.

III.

On the Occurrence of *Agrostis verticillata*, Vill., and *Alsine atheniensis*, nobis, in the Channel Islands. By G. CLARIDGE DRUCE, M.A., F.L.S.

[Read 7th March, 1907.]

AGROSTIS VERTICILLATA, *Villars*, in the Channel Isles.

A. verticillata, Villars, Prosp. Fl. Dauph. p. 16 (1779), et Histoire, ii. p. 74 (1787); not of Thuill. Fl. Par. ii. p. 36 (1790).—*A. stolonifera*, Linn. Herb. (not of the 'Species Plantarum'); Richter, Fl. Europ. p. 42 (1890).—*A. aquatica*, Pourr. in Act. Toul. iii. p. 306 (1783).—*A. densa*, M. Bieb. Fl. Taur. Cauc. i. p. 56 (1809).—*A. refracta*, Moench, Meth. Suppl. p. 60 (1794).—*A. alba*, Chaix in Vill. l. c., not of Linn.—*A. rivularis*, Brot. Fl. Lusit. p. 75 (1804).—*A. Villarsii*, Poir. Enc. Méth. Suppl. i. p. 251 (1810).

Vilfa stolonifera, Presl, Cyp. & Gram. Sic. p. 22 (1820).

Inhabiting South Europe and Portugal; adventitious in Western France and Hamburg.

Descr. Stoloniferous. Stems 6–20 inches, geniculate, ascending; leaves flat, soft, glaucous; ligule short, truncate; panicle 1–4 inches long, compact, thyrsoidly-lobate; branches rough, remaining open after flowering, *garnished with spikelets to their base*, greyish-green or purplish-red; glumes subobtusely, puberously-scabrid over the whole surface; pales equal, obtuse.

This species greatly resembles *Agrostis alba* (the variety of which in Britain we know as *A. stolonifera*, and is perhaps identical with var. *prorepens*, Koch) in habit and general appearance, but may be known by the branchlets being garnished with

spikelets to the base, whereas in *alba* and its varieties they are bare of spikelets.

Last July, when in the company of Mr. E. D. Marquand, I saw growing plentifully in the excavated soil near the Vale Castle in Guernsey a grass which was different from any British form known to me, and subsequently found it covering an extensive area and in considerable quantity, not only in such situations, but also by the sides of roads and other dry bare places in the northern portion of Guernsey and also extending westwards to the Grande Mare, where it grew by the roadside. On my visit to Alderney I found it growing on made soil in Braye Bay and on quarry débris farther east. I have also detected a small piece among some grasses gathered at St. Luke's, Jersey, in the previous June, but this was on some recently disturbed ground, where alien plants were present. In Corbière's 'Nouvelle Flore de Normandie' he reports it as a southern species naturalized for upwards of 40 years at Cherbourg, especially about the ditches of the western port. From the fact of its not being a native of Western France, it may be held to be also adventitious in the Channel Islands, and in a country so disturbed by the operations of man as these small islands, it must be very difficult to decide. On the one hand, there are the facts of its absence from the opposite coast of France as a native species, and that no botanist has hitherto recorded it from the islands, while the geographical range is not strongly in favour of its being native in the Channel Islands; yet, on the other hand, it may be urged that it extends up the western coast as far as Spain and Portugal, that it is extremely similar to *A. alba* var. *stolonifera* in appearance and chooses the same situations, and may thus have escaped observation, while in its undoubtedly native area it prefers ground which has been disturbed by man, and that it is now at any rate abundant and widely spread; moreover, the recent discovery of *Spergularia atheniensis* in Jersey (a distinctly Mediterranean species) supports the possibility of its being native.

Curiously it represents *A. stolonifera* in the Linnean Herbarium, and for that reason Richter in the 'Plantæ Europææ' puts it under that name. But as Linnæus bases his *stolonifera* on the plant described in the 'Flora Suecica,' ii. p. 66 and i. n. 61, it evidently cannot refer to this Mediterranean species. Indeed, some authors have thought it refers to *A. vulgaris*, With.; but since this plant represents *A. stolonifera* in his herbarium it would appear more probable that the well-known form of *A. alba*, which mimics this plant so closely, is really the Linnean *stolonifera*.

ALSINE ATHENIENSIS, nobis, in Jersey.

Spergularia atheniensis, Ascherson ex Schweinfurth, Beitr. Fl. Æthiop. p. 267 (1867), *nomen tantum*; Nyman, Consp. p. 123; Halacsy, Consp. Fl. Græc. i. p. 251.—*S. rubra* var. *atheniensis*, Heldr. & Sart. in Heldr. Herb. Græc. Norm.

n. 590.—*S. campestris*, Heldr. Herb. Græc. Norm. n. 831 (not of Ascherson); Willk. & Lange, Prod. Fl. Hisp. ii. p. 165.—*Spergularia diandra*, Boiss. Fl. Or. i. p. 733; and Index Kew. ii. p. 956.

Descr. Annual or biennial. Glandular-viscous, prostrate or ascending, nearly leafless at the base. Leaves long, linear, flat. Stipules subtriangular, broader than long, and overlapping at the base, dull greyish-yellow. Flowers numerous, in dense leafless or nearly leafless cymes, the pedicels shorter than the capsules. Sepals lanceolate, with scarious margin. Petals obovate, as long or a little shorter than the sepals. Stamens from 5 to 10, usually about 7 or 8 in number. Capsule slightly exceeding the calyx. Seeds wingless, greyish-brown, larger than those of *S. rubra*.

From *S. rubra* it may easily be distinguished by the absence of the basal rosette of leaves, and by the short, broadly-ovate, dull-coloured stipules, so different from the long, narrow, lanceolate, glistening silvery-white stipules of *S. rubra*. From the more closely allied *S. diandra*, with which it is united or confounded by Lebel, Kindberg, and 'Index Kewensis,' and under which as a subspecies it is placed by Nyman, *Alsine atheniensis* may be known by its more robust appearance and by the more numerous stamens, *S. diandra*, as its name implies, having 2 or 3 only.

Alsine atheniensis is found in sandy places on or near the coast of the Mediterranean from Phaleron, near Athens, where I have seen it, westwards to Spain, and it also occurs in Corsica. *S. diandra* is recorded by Nyman from Portugal.

The above description has been drawn up from the Jersey plant, which I found last June growing on loose sand at and near St. Heliers. Its occurrence in Jersey, where there is, I suppose, no reason to doubt its being indigenous, although it grew on ground near the coast railway, is especially interesting from its being a Mediterranean species unrecorded for the coast of Western France, although, as we have seen, the closely-allied *S. diandra* is reported from Portugal. The presence of the Mediterranean element in the flora of the Channel Isles at present awaits a perfectly satisfactory explanation, although Mr. Lester-Garland, in 'Flora of Jersey,' offers an ingenious suggestion.

IV.

On the Ecological Functions of Stolons and Cleistogamous Flowers. By J. C. SHENSTONE, F.L.S.

[Read 18th April, 1907.]

THE colonies of plants formed by means of rhizomes, creeping stems, offsets, runners and suckers, or by the self-planting of seeds in the immediate neighbourhood of the parent plant, are familiar to us all, but an important service which this habit of forming colonies affords to the species appears to have been overlooked.

It is self-evident that a more or less dense colony of plants has

a much better chance of holding its own, when surrounded by luxuriant vegetation, than single individuals would have. Colonization also often affords important service by rendering the pollinization of the ovule more certain than would be the case if the plants were thinly scattered as isolated individuals. In the case of rock-loving plants, the cushion-like colonies, so frequent among our rock flora, retain moisture by collecting débris and dust round the thickly-matted offsets.

It may be well to recall some familiar examples illustrating the advantages secured by this habit of colonization.

The common daisy (*Bellis perennis*) affords us a typical example of a plant which would certainly be smothered if it grew in a condition of isolation. Those who have watched this little plant gradually taking possession of their lawn, must have noticed the first unfolding of its rosette of stiff leaves, either in some thin place upon the lawn, or at an earlier period of the season, before the surrounding herbage has commenced to grow. Having secured its foothold, it quickly sends up offsets which soon clear a comparatively large space, thus securing an abundance of light and air. The colony rapidly spreads, neighbouring colonies join their forces, until a large portion of the lawn is occupied by our humble friend.

The short, thick rhizome of the iris (*Iris Pseudacorus*) co-operates with the rigid sword-shaped leaves to secure light and air for a plant growing under very different circumstances. Even the rank riverside vegetation is quite unable to resist the force of the growth of these thick rhizomes crowned by rigid leaves. Nor must we overlook the important service rendered by colonies of grasses and sedges on our sand-dunes, in holding the sand together by their matted roots; but for these matted offshoots no plant could live upon these sands.

Amongst the wind-fertilized plants, the perennial mercury (*Mercurialis perennis*) illustrates the service rendered by colonies. The seedling plant quickly forms comparatively thick colonies by means of underground stems, and the inflorescence is developed in the early spring before the woodland vegetation has appeared; otherwise the wind-blown pollen of this plant would be obstructed in its passage from colony to colony. One colony produces staminate flowers exclusively, another colony produces pistillate flowers only. The colony of staminate flowers sends out clouds of pollen, whilst the pistillate flowers unfold their stigmas gradually, and are thus for a long period ready to catch the pollen as the clouds pass in their direction. It is clear that pollination would be more precarious if the pollen was produced in small quantities by isolated plants.

The common stinging-nettle (*Urtica dioica*) also forms colonies by means of underground stems, and these likewise send out clouds of pollen which fertilize flowers of neighbouring colonies.

The wild thyme (*Thymus Serpyllum*) may be cited as an example of a plant which secures the fertilization of its ovules by the formation of dense colonies. Its flowers would have small chance

of attracting visitors required for cross-fertilization, if its slender stems lost themselves amongst surrounding vegetation, instead of forming dense tufts covered with bright flowers. These tufts also send out much larger volumes of the odour so characteristic of the plant than isolated stems would do, and thus afford an additional attraction to insects.

In the pretty little moscatel (*Adoxa Moschatellina*) we have a rare instance of an entomophilous plant emitting a slight odour, secreting nectar, and yet being devoid of the brightly coloured corolla which we associate with such distinctly entomophilous plants. Grant Allen tells us that no reason can be given for the green corolla of this plant, but I would suggest that the formation of colonies of these bright green plants *by underground stems* renders them very conspicuous in contrast with the brown coloration of our woodlands in spring, and thus bright-coloured corollas are not necessary.

I would now direct attention to the two most characteristic cleistogamic flower-producing plants of our British flora. Careful observation will show us that these cleistogamous flowers not only serve the plants by producing mature seeds without the aid of wind or insects—an important service, but also by keeping the colonies of plants dense in their very centres, and by this means enabling the colonies to maintain themselves against outside attack for much longer periods.

The sweet violet (*Viola odorata*), growing in woods and hedges surrounded by luxurious vegetation, would soon be smothered if growing as isolated plants or in straggling colonies. The plant thrusts the capsules, produced by the cleistogamous flowers abundantly in the autumn, to the ground close to the parent plant; thus a number of vigorous young seedlings are introduced into the colonies, reinvigorating them at their centres, whilst the creeping stems spread outwards and extend the colonies in a centrifugal manner. The seeds produced by the perfect flowers, which serve to start new colonies, are very sparingly produced, hence it is important to the plant that the colonies, when once established, should hold their own for a lengthened period.

It is noteworthy that the dog violet (*Viola canina*), growing in more open situations and surrounded by less luxuriant vegetation, relies much more upon its perfect flowers for the reproduction of the species. These perfect flowers are produced later in the season, when insects are more abundant, and consequently produce an abundance of seed. They thrust the capsules produced by these perfect flowers well above the surrounding vegetation and scatter their seeds very widely. The plant appears to realize that it lives under different conditions to those under which its near relative the sweet violet has to struggle, and takes full advantage of the more favourable conditions. Nevertheless it develops cleistogamic flowers, and plants the seeds produced by them inside the colonies, though relying less upon them. It is

noteworthy also that whilst the wood violet relies upon its strong perfume for drawing the few insects which fly in the spring to its flowers, not attempting to raise its flowers above the vegetation surrounding it; the dog violet raises its flowers and makes itself conspicuous by their light violet colour, dispensing with perfume altogether.

The wood sorrel (*Oxalis Acetosella*), like the wood violet, flowers in very early spring, and forms colonies of bright green small plants by means of underground stems in shady situations in woods. It selects situations where at this early period of the year vegetation is not abundant, and when the contrast between these colonies of bright green plants serves to attract the few insects on wing from some distance; its delicately-tinted corolla serving as a sign to insect visitors that nectar may be found within. This has likewise small, inconspicuous cleistogamous flowers, which carefully bury the capsule in the ground; the mature capsules being surprisingly large. These serve to re-invigorate the colonies, but the perfect flowers of these plants raise their capsules high up in the air, and are provided with mechanism serving to shoot the seeds to a great distance, a feat which later in the season would be impossible—the seeds would then be obstructed by other plants.

It is noteworthy that in the above plants both the stolons and the cleistogamous flowers co-operate with the other organs in the very important function of enabling the species to contend against the competition in the environment in which it lives. The manner in which the cleistogamous flowers supplement the action of the creeping stems in producing dense colonies is peculiarly instructive. The important function served by these organs appears to have been overlooked by botanists.

It appears to me doubtful whether, the bisexual process of reproduction having been perfected, the less perfect method by offshoots, or degenerate cleistogamous flowers, would survive, unless they showed some important secondary functions beyond the reproduction of the species.

A LETTER FROM
CARL VON LINNÉ

TO PROFESSOR PIETRO ARDUINO,
AT PADUA,

WITH AN INTRODUCTION BY

DR. G. B. DE TONI, HON. F.R.M.S.

(Communicated by Dr. D. H. Scott, F.R.S.,
Secretary of the Linnean Society.)

*CONTRIBUTED TO THE ANNIVERSARY MEETING OF THE LINNEAN
SOCIETY OF LONDON, 24TH MAY, 1907, IN COMMEMORATION OF
THE 200TH ANNIVERSARY OF THE BIRTH OF CARL VON LINNÉ.*

(Born $\frac{13}{23}$ May 1707; died 10 Jan. 1778.)

A Letter from CARL VON LINNÉ to PIETRO ARDUINO.

*Contributed with an Introduction by Dr. G. B. DE TONI,
Hon.F.R.M.S.*

(Communicated by Dr. D. H. SCOTT, F.R.S., Sec.L.S.)

I HAVE the honour of taking part in the celebration by the Linnean Society of London of the 200th anniversary of the birth of the great systematist Carl von Linné, by contributing a letter * which the Swedish naturalist despatched on the 3rd November 1764 from Upsala to the Italian botanist, Pietro Arduino, at Padua †.

This letter, which Mr. S. Morpurgo, director of the National Library in Florence, has been so kind as to have transcribed from the original preserved in the "Collezione Autografi, fondo Gonnelli, Cart. 21, no. 113," furnishes several particulars of considerable interest as to the relations existing between the two botanists with regard to certain plants which Arduino had sent by special request to Linné.

In this letter the Swedish botanist gives expression to his great regret at the loss of Forskål, the explorer of Arabia, one of his pupils, who, previous to his death in 1763 ‡, had communicated

* With regard to the correspondence of Linné with the naturalists of his time, reference may be made to:—G. A. Pritzel, 'Thesaurus literaturæ botanicæ,' Lipsiæ (Brockhaus), 1872, 4°, p. 188; 'Linnæana in Nederland aanwezig,' Amsterdam (Scheltema & Holkema), 1878, 8°, pp. 42-45; to which may be added, 'Lettere inedite di Carlo Linneo a Giovanni Antonio Scopoli' (published under the editorship of Messrs. G. de Cobelli and C. Delaiti), Rovereto (V. Sottocchia), 1889, 8°; and A. Alberg, 'The Floral King; a Life of Linnaeus,' London (Allen & Co.), 1888, 8°.

† Pietro Arduino, born at Caprino (Verona), 18th July 1728, Professor of Agriculture at the University, and Director of the Botanic Garden at Padua, where he died, 13th April 1805. For biographical notices, see P. A. Saccardo, 'La botanica in Italia,' Venezia (M. Ferrari), 4°; Parte I. 1895, p. 17; Parte II. 1901, p. 12.

‡ Pehr Forskål, born at Calmar (Småland) in 1736, died at Jerim (Arabia), 11th July 1763, and not 1768, as indicated by G. A. Pritzel, *Thes. bot.* p. 110, and following him by Saccardo, *op. cit.* p. 74. Evidently this is due to a blunder in copying, for an old work gives 1763 as the true year of the death of the botanical traveller Forskål; see C. Sprengel, 'Historia rei herbariæ,' Tomus ii. p. 420, Amstelodami, 1808.

some observations on the plants collected in the region through which he was travelling.

The following is the Latin text of Linné's letter:—

Viro Clarissimo

D. PETRO ARDUINO

s. p. d.

CAR. A LINNÉ, *Equ.*

Epistolam quam ad me pridie calend. Julii exarabas, rite accepi; at fasciculum simul missum nondum. Tabellarius enim 6 nummos aureos (Ducatos aureos) pro fasciculo exigebat, quod mihi videbatur nimis pretiosum. Solvuntur enim heic omnes epistolæ secundum uncias; et pro quavis uncia exoticarum tabellario renumeratur $\frac{1}{8}$ pars Ducatus. Si, vir amicissime, inscripsisses fasciculo, uti antea monui * Societati Regiæ Scientiarum Upsaliæ, tum habuissem eundem absque impensis. Scribebam Holmiam ad magnates quibus tabellarii res paret, nec responsum accepi. Solvi antea hoc anno ultra 40 ducatos pro literis; nunc delassatus proposui non redimere literas quæ constant ultra unum ducatum.

Astragalus chinensis mihi duplex est; tuus erit sine dubio parvus acaulis purpureus quem habeo una cum Vello pseudocytiso † et Nolana prostrata.

Præpropera fata Forskählei mei in Arabia felici multo me affecere dolore; habui literas paulo ante eius mortem de genere opobalsimi [sic] cum ejus caractere octandra 1-gynia tetrapetala ‡. Tandem accepi in hortum verissimum Rhabarbarum quod est Rhabarbarum palmatum nec non Actaeam cimicifugam quam diu avidissime exoptavi; at hæc non dum mihi floruit, spero proximo anno florituram.

* For reasons of economy, Linné was accustomed to beg his correspondents to send letters and packets to the 'Societas Regia Scientiarum Upsaliæ'; the same request will be found in letters addressed to Scopoli and published by Cobelli et Delaiti.

† Gen. *Vella*, L. (1737). Cruciferae. Sp. *Vella Pseudocytisus*, L.

‡ It is obvious that he is referring to *Amyris Opobalsamum*, described in the posthumous work of Forskål, 'Flora Aegyptiaco-Arabica sive descriptiones plantarum, quas per Aegyptum inferiorem et Arabiam felicem detexit, illustravit, Petrus Forskål, post mortem auctoris edidit Carsten Niebuhr,' p. 79, Hauniæ, Ex off. Mölleri. 4°.

Floruit mihi hoc tempore tua Salvia cum minutis floribus, diversissima ab americana, quam putaveram quondam eandem fuisse. Miror quod potueras videre stamina Salviæ in hac, tam parva, tamen genuina. Videtur mihi fore perennem plantam.

Dabam Upsaliæ 1764 d. 3 Novembris.

Viro Amplissimo

D^{no} PETRO ARDUINO,

Professori Publico,

Paduæ.

[Translation.]

CARL VON LINNÉ, *Knight,*

with cordial greeting

to the distinguished PIETRO ARDUINO.

I have duly received the letter which you wrote to me on the 3rd June, but not yet the packet sent at the same time. The postman demanded 6 rixdollars (gold ducats) for the packet, which seemed to me excessive. They charge all letters so much per ounce, and for each foreign letter the postman charges one-third of a rixdollar per ounce. If, my dear friend, you had addressed your packet, as I have previously advised, to the Royal Society of Sciences at Upsala, I should have received it free of charge. I wrote to the postal authorities at Stockholm, but have received no reply. I have during the present year paid more than 40 rixdollars for letters; I am now tired of this, and propose not to take in letters which cost more than one rixdollar.

My *Astragalus chinensis* has two forms; yours is doubtless the small stemless purple one which I have, with *Vella pseudocytisus* and *Nolana prostrata*.

The untimely fate of my pupil Forskål in Arabia felix has occasioned me much grief; I had letters from him shortly before his death, about the genus *Opobalsamum*, with its characters, eight stamens, one style, four petals. At last I have received into my garden the true Rhubarbarum which is *Rhabarbarum* [recte *Rheum*] *palmatum*, together with *Actæa cimicifuga* which I have long ardently wished for, but the latter has not yet flowered with me, though I hope it will next year.

At the present time your *Salvia* with small flowers is flowering with me; it is very different from *S. americana*, which at one time I thought to be the same. I am surprised that you were able to see the stamens in this *Salvia*, true stamens though so diminutive. It seems as though it may be a perennial plant.

Upsala, 3rd November, 1764.

To Professor P. ARDUINO,
Padua.

ON A MANUSCRIPT LIST
OF THE
LINNEAN HERBARIUM
IN THE
HANDWRITING OF CARL VON LINNÉ,
PRESUMABLY COMPILED IN THE YEAR
1755.

BY
BENJAMIN DAYDON JACKSON,
GENERAL SECRETARY OF THE LINNEAN SOCIETY
OF LONDON.

To which is appended a Catalogue of the Genera
in the Herbarium, with the numbers of sheets
of specimens.

*PREPARED FOR THE ANNIVERSARY MEETING OF THE LINNEAN
SOCIETY OF LONDON, 24TH MAY, 1907, IN CELEBRATION OF THE
200TH ANNIVERSARY OF THE BIRTH OF CARL VON LINNÉ.*

No portion of the Linnean Society's collections is so frequently consulted as the Linnean Herbarium. Suggestions have been frequently made that a full catalogue of this Herbarium should be printed and issued by the Society, but the difficulties in the way of complying with such suggestions have hitherto proved insuperable. In the original cabinets are contained nearly 14,000 sheets, which would need a thick octavo volume merely to record the names of the species and accompanying notes. So brief a catalogue would be of very little service to the botanists who refer to the Herbarium, while a complete critical enumeration of every specimen is at present quite unattainable. A host of specialists would be required, and as the specimens naturally are not allowed to be taken from the Society's rooms, nor tampered with in any way, it would mean that these experts would have to perform their task under disadvantageous conditions; they would have to rely upon their recollection and not upon their power to match species by placing specimens side by side.

There have been numerous references to special genera and species scattered throughout the literature of descriptive botany, from the days of Sir J. E. Smith to the present time, but we may say that only five considerable portions of the Herbarium have hitherto been adequately examined and the reports published. These are:—

1. HARTMAN (C.).—"Anteckningar vid de Skandinaviska växterna i Linnés Herbarium." *Handl. K. Sv. Vet.-Akad. Stockholm*, 1849 (1850) pp. 145-191; *ibid.* 1851 (1853) pp. 211-426.
2. MUNRO (W.).—"On the Identification of the Grasses of Linnæus's Herbarium . . ." *Journ. Linn. Soc., Bot.* vi. (1861) pp. 33-58.
3. ANDERSON (T.).—"On the Identification of the Acanthaceæ of the Linnean Herbarium . . ." *Journ. Linn. Soc., Bot.* vii. (1863) pp. 111-118.
4. SCHIMPER (W. P.).—"Synonymia Muscorum herbarii Linnæani . . ." *Journ. Linn. Soc., Bot.* xi. (1869) pp. 246-252.
5. CLARKE (C. B.).—"On certain authentic Cyperaceæ of Linnæus." *Journ. Linn. Soc., Bot.* xxx. (1894) pp. 299-315.

By the foregoing statement it will be understood how small a

portion of the Herbarium has been investigated by experts, and how large a portion remains only partially explored.

The mere cataloguing of the sheets offers considerable difficulty: it can only be accomplished by some person adequately equipped with a knowledge of the handwriting of the various persons who contributed the plants to Carl von Linné; a transcriber only would be useless.

Though the perfect catalogue is to be hoped for rather than expected, the Linnean Society has two catalogues which supply some information, and the present paper is concerned with these. In the Banksian collections, formerly at the British Museum, at Bloomsbury, and now at Cromwell Road, South Kensington, there exists a copy of Linné's '*Species Plantarum*,' first edition, marked by either Solander or Dryander (probably the latter) with a short stroke under the running number of each species, showing what species at some unstated date were represented in the Linnean Herbarium (see *Journ. Bot.* xxxiv. (1896) pp. 359-362). These references were copied by Mr. W. Carruthers into a copy of the '*Species Plantarum*' which he gave to the Royal Botanic Gardens, Kew, in 1871, which copy also contains the suppressed pages reprinted in facsimile by Herr von Flatt in the '*Botanisches Centralblatt*,' Bd. lxvi. (1896) pp. 218-219. It was formerly supposed that these marks were inserted during the winter of 1784-5, when the Linnean Herbarium was compared with that belonging to Sir Joseph Banks (*Proc. Linn. Soc.* 1887-88 (1890) pp. 27-28), but this is probably an error, for amongst the Linnean books, one of the two interleaved and annotated copies of the first edition of the '*Species Plantarum*' is marked in the same manner; it seems certain that from this Dryander copied his notes.

Notwithstanding the interest attaching to this copy and its secondary copies, another list exists of a somewhat later date, and fuller in details. It consists of a small quarto volume, 20 cm. $\times$ 16 cm., without title or heading, in contemporary binding with calf back and corners, and sides covered with sprinkled paper; it contains 39 leaves written on both sides in double column (except the last page) of all the names of plants then known, with a mark against such as were in the Herbarium. This mark was at first an underscore as in the '*Species Plantarum*,' but from the sixth page onwards the mark consists of a dot placed before the figure in front of each name, as shown in the specimen page annexed (p. 95). A blank leaf was left between each written leaf, but at some later period three of these blank leaves were roughly

torn out, and the remainder used for drafts of specific descriptions by the younger Carl von Linné.

The age of the list may be placed about the middle of 1755 for the following reasons:—

The significant mark is changed in the course of transcription from an underscore to a dot, apparently an afterthought when copying from the book record. Another proof of the relative ages of the two records may be found in this, that the supplementary part of the 'Species Plantarum' (pp. 1190–1200), and two pages added without pagination after 'Nomina trivialia,' are inserted in their proper sequence, e. g. *Thalia*, p. 1193, is placed in the MS. list under Monandria Monogynia between *Kæmpferia* and *Boerhavia*, and the three species of *Filago* from the end, are correctly placed. Too much reliance must not be placed on this, for *Boerhavia diandra* (p. 1194) is interpolated on the first page of the MS. thus

3 *scandens*,
5 *diandra*,
4 *repens*.

Again, in the list as originally drawn up we find some species which were published afterwards, occupying their proper position, thus seeming as if the plants were known to the compiler but were awaiting their opportunity to be published. For possibly two years the author seems to have added names chiefly from the theses 'Demonstrationes plantarum' resp. J. C. Höjer, Oct. 1753, 'Herbarium Amboinense' resp. O. Stickman, Maii 1754, and 'Centuria plantarum I.' resp. A. D. Juslenius, Febr. 1755; from 'Centuria plantarum II.' resp. E. Torner, Jun. 1756, I find only one entry, and from the fact that practically all the species from Cent. I. are entered and practically none from Cent. II., we may conclude that the entries ceased soon after the former was printed, that is in the spring of 1755, to which period I would assign this catalogue.

The list offers many points of interest, but I must confine my remarks to a few only. It was written without special care, for I find no fewer than eighteen species published in the 'Species Plantarum' which were overlooked and inserted afterwards, such as the *Boerhavia diandra* previously mentioned. Some of the interpolations are incorrect; the following are referred to as from the 'Cent. I.,' but they will be found as noted in parentheses—*Bupleurum semicompositum* (Dem.), *Cistus hirta* (Sp. Pl.), *Antirrhinum sparteum* and *A. molle* (both Sp. Pl.), and *Trifolium Cherleri* (Dem.). It must be noted that these citations are from

the original theses, and not from the reprints in 'Amœnitates Academicæ,' iv. pp. 261-296, where several names were changed, e. g. *Antirrhinum sparteum* and *A. molle* became *A. junceum* and *A. glaucum* respectively, and *Potentilla heptaphylla* is changed to *P. opaca*. Further, *Dianthus hyssopifolius* was changed in 'Am. Acad.' to *D. superbus*, *Geranium versicolor* became *G. striatum*, and *Hieracium tomentosum* was renamed *Andryala lanata*. Several names also occur which were not published with diagnosis till later; such are *Convolvulus Dorycnium*, *Silene quadrifida*, *Psidium Cujavus*, *Myrtus Leucadendra*, *Dolichos tetragonolobus* and *D. pruriens*, which appeared in the tenth edition of the 'Systema' in 1759, the last four being mentioned only by name in 'Herb. Amb.'

There remain three names in the list deserving of special attention: (1) *Sison ammoides*, a manuscript and unpublished name for *Seseli ammoides*, Sp. Pl.; (2) *Lupinus stoloniferus*, Cent. I., was not brought forward in 'Am. Acad.' and proves to be *L. hirsutus*, Sp. Pl.; and (3) *Trifolium retusum*, which has escaped all recognition in later works, proves to be that species described in 'Demonstrationes plantarum,' p. 21, in a footnote as "*TRIFOLIUM capitulis fructus imbricatis, calycibus reflexis patulis corolla longioribus. Habitat in Hispania, Loeß.*" etc. [These seven lines as well as the name "retusum," were not reprinted in 'Am. Acad.' iii. p. 419 (1756).] This is the "*Trifolium retusum album, calycibus reflexis patulis*" of Loeßling's 'Iter hispanicum,' Stockholm, 1758, p. 88. A reference to the Linnean Herbarium shows the specimen, as unfortunately is so often the case, without any note of its origin, to be *Trifolium strictum*, Linn.! the word "*retusum*" being written by Linné at the base of the specimen.

In concluding these remarks on the volume specified, I may perhaps be permitted to refer to the Herbarium itself. It must not be allowed to escape our minds that the Linnean Herbarium differs in many respects from the modern idea of an herbarium. Carl von Linné in a multitude of cases described his species from the books of his predecessors, and his dried plants were frequently used to modify the diagnoses of the previously described species. It was only when he was strictly confined to a single specimen that Linné was forced to keep to the plant actually under his eyes, and to describe it as would now be done with newly found plants.

I have formerly set forth the method by which the Linnean Herbarium came into being, and how it grew (Proc. Linn. Soc.

1887-88, pp. 18-22). That account may be supplemented by the statement that the Herbarium appears to be practically as it was on the death of the elder Linné, the bulk of his son's accretions being incorporated in the herbarium of Sir J. E. Smith, also in the possession of the Linnean Society. The collection may be said to consist of three series of plants—(a) those cited in the two editions of the 'Species Plantarum'; (b) those omitted from that work, but named by Linné himself, and probably acquired at a later date or intentionally set aside, amongst these being the plants of the 'Mantissæ' and the 'Supplementum'; and (c) various additions, some of which perhaps never came under the scrutiny of the elder Linné, but were put in by the son. The plants which Smith gave to Banks, 81 in number, were duplicates, as I have satisfied myself (Proc. Linn. Soc. 1902-3, p. 10).

A transcript of the catalogue of the genera contained in the Linnean Herbarium is appended; it was drawn up by order of the Council of the Linnean Society, 21st May, 1836, and consists of, firstly, an enumeration of the genera in the Linnean order with a running number prefixed, and followed by the number of sheets under each genus; and, secondly, an alphabetic arrangement, with reference to the running numbers, so that any required genus can be as readily found as a page in a book by its index.

A comparison of this list of genera with the Linnean manuscript catalogue shows a few discrepancies; thus Linné enumerates the following which will not be found in the appended catalogue:—

Leucadendron; merged in *Protea*.

Diodia; wanting.

Cupania; wanting.

Scurrula; merged in *Loranthus*.

Barreria; proves to be *Ajathosma imbricata*, Willd., and the type-sheet is in the *Diosma* cover.

Calamus; wanting.

Bartramia; merged in *Triumfetta*.

Dalibarda; is *Rubus Dalibarda*.

Sarracenia; cover empty.

Nepenthes; wanting. A small unmarked sheet in Smith's herbarium may be this.

I have searched Smith's herbarium under each of these missing genera, but, with the possible exception mentioned under *Nepenthes*, I have found nothing to throw any light on the omissions, which cannot have occurred since the collection came into the possession of the Linnean Society.

[RECTO OF LEAF 45 OF THE MS. CATALOGUE.]

Lupinus	·1	perennis stoloniferus <i>Cent.</i>	Pisum	1	sativum
	·2	albus		2	arvense
	·3	varius		·3	maritimum
	·4	hirsutus		·4	Ochrus
	·5	angustifolius	Orobus	·1	Lathyroides
Robinia	·6	luteus		·2	hirsutus
	·1	Pseudo Acacia		·3	luteus
	·2	grandiflora		4	vernus
	·3	Caragana		·5	tuberosus
	L ·4	frutex *		·6	angustifolius
Colutea	·5	pygmæa		·7	niger sylvaticus <i>Cent.</i>
	·1	arborescens		8	pyrenaicus
	L ·2	frutescens *	Lathyrus	1	Aphaca
Phaseolus	·3	herbacea		·2	Nissolia
	·1	vulgaris nanus <i>Cent.</i>		·3	amphicarpos
Dolichos	·2	coccineus		4	Cicera
	3	lunatus		5	sativus
	4	inamœnus		6	inconspicuus
	5	farinosus		·7	setifolius
	6	vexillatus		·8	angulatus
	7	helvulus		·9	bithynicus†
	8	alatus		·10	articulatus
	9	Caracalla		·11	odoratus annuus <i>Dem</i>
	·10	radiatus		·12	hirsutus
	·11	Max		·13	tingitanus
	·1	Lablab		·14	Clymenum
	2	unguiculatus.		·15	tuberosus
	3	ensiformis		16	pratensis
	4	minimus		·17	sylvestris
	·5	scarabæoides		·18	latifolius
	·6	erosus		·19	heterophyllus
	·7	trilobus		·20	palustris
	8	regularis		·21	pisiformis
	9	lignosus			
	10	polystachyos			
	11	Soja			
	12	biflorus			
		tetragonolobus <i>Amb.</i>			
		pruriens <i>Amb.</i>			

* The prefixed letter L may mean Loeffling

† Afterwards struck out; = *Vicia bithynica*, Linn. Syst. ed. X. (1759).

LIST

OF THE

GENERA IN THE LINNEAN HERBARIUM.

-
1. SYSTEMATICALLY ARRANGED AFTER THE LINNEAN SYSTEM, in 1292 genera, with 13753 sheets of specimens.
 2. ALPHABETICALLY ARRANGED, giving the running numbers of the genera as index numbers.
-

MONANDRIA.						Sheets.	
MONOGYNIA.							
		Sheets.					
1	Canna	5	17	Jasminum	7		
2	Renealmia	1	18	Ligustrum	2		
3	Amomum	6	19	Phillyrea	6		
4	Costus	2	20	Olea	6		
5	Myrisma	1	21	Chionanthus	1		
6	Maranta	3	22	Syringa	4		
7	Curcuma	4	23	Dialium	1		
8	Kæmpferia	3	24	Eranthemum	1		
9	Boerhavia	9	25	Circæa	2		
10	Salicornia	13	26	Veronica	67		
11	Hippuris	3	27	Pæderota	5		
DIGYNIA.			28	Justicia	34		
12	Corispermum	3	29	Dianthera	4		
13	Callitriche	3	30	Gratiola	12		
14	Blitum	4	31	Schwenkia	1		
15	Cinna	2	32	Calceolaria	3		
DIANDRIA.			33	Pinguicula	3		
MONOGYNIA.			34	Utricularia	9		
16	Nyctanthes	6	35	Verbena	20		
			36	Lycopus	5		
			37	Amethystea	1		
			38	Cunila	8		
			39	Zizyphora	4		
			40	Monarda	7		
			41	Rosmarinus	2		

	Sheets.		Sheets.	
42	Salvia	73	81 Phleum	7
43	Collinsonia	1	82 Alopecurus	11
44	Morina	1	83 Milium	8
45	Globba	3	84 Agrostis	49
	DIGYNIA.		85 Aira	23
46	Anthoxanthum	2	86 Melica	10
	TRIGYNIA.		87 Poa	78
47	Piper	18	88 Briza	10
	TRIANDRIA.		89 Uniola	7
	MONOGYNIA.		90 Dactylis	8
48	Valeriana	25	91 Cynosurus	23
49	Tamarindus	3	92 Festuca	36
50	Cneorum	1	93 Bromus	60
51	Melothria	2	94 Stipa	12
52	Rotala	1	95 Avena	35
53	Ortega	3	96 Lagurus	2
54	Loeflingia	1	97 Arundo	18
55	Polycnemum	3	98 Aristida	11
56	Crocus	2	99 Lolium	11
57	Witsenia	1	100 Elymus	15
58	Ixia	39	101 Rottboellia	11
59	Gladiolus	33	102 Secale	2
60	Antholyza	10	103 Hordeum	9
61	Iris	33	104 Triticum	20
62	Moræa	7		TRIGYNIA.
63	Dilatris	3	105 Eriocaulon	9
64	Wachendorfia	1	106 Montia	2
65	Commelina	20	107 Proserpinaca	1
66	Callisia	2	108 Triplaris	1
67	Xyris	2	109 Holosteum	3
68	Schoenus	17	110 Kœnigia	1
69	Kyllinga	12	111 Polycarpon	2
70	Cyperus	76	112 Mollugo	9
71	Scirpus	85	113 Minuartia	16
72	Eriophorum	4	114 Queria	2
73	Nardus	9	115 Lechea	6
74	Pommereulla	2		TETRANDRIA.
75	Lygeum	1		MONOGYNIA.
	DIGYNIA.		116 Protea	40
76	Cornucopiæ	4	117 Globularia	5
77	Saccharum	7	118 Cephalanthus	2
78	Phalaris	14	119 Dipsacus	4
79	Paspalum	11	120 Scabiosa	44
80	Panicum	73	121 Knautia	6
			122 Allionia	1
			123 Hedvotis	13

	Sheets.		Sheets.	
124	Scabrita	2	171 Hypecoum	5
125	Spermacoce	13	172 Gomozia	1
126	Sherardia	3		
127	Asperula	15		TETRAGYNIA.
128	Houstonia	4	173 Ilex	3
129	Galium	50	174 Coldenia	2
130	Crucianella	5	175 Potamogeton	16
131	Rubia	7	176 Ruppia	2
132	Ixora	3	177 Sagina	5
133	Pavetta	3	178 Tillæa	6
134	Petesia	2		
135	Mitchella	1		PENTANDRIA.
136	Callicarpa	4		MONOGYNIA.
137	Samara	2		
138	Sirium	2	179 Heliotropium	14
139	Polypremum	1	180 Myosotis	12
140	Penæa	10	181 Lithospermum	13
141	Blaeria	5	182 Anchusa	8
142	Buddleia	4	183 Cynoglossum	11
143	Exacum	4	184 Pulmonaria	10
144	Plantago	32	185 Symphytum	4
145	Scoparia	3	186 Cerinthe	2
146	Rhacoma	1	187 Onosma	7
147	Centunculus	1	188 Borago	6
148	Sanguisorba	3	189 Asperugo	2
149	Cissus	7	190 Lycopsis	6
150	Epimedium	1	191 Echium	24
151	Cornus	13	192 Messerschmidia	1
152	Fagara	2	193 Tournefortia	7
153	Ptelea	2	194 Nolana	1
154	Ludwigia	3	195 Diapensia	1
155	Oldenlandia	6	196 Aretia	4
156	Ammannia	5	197 Androsace	12
157	Isnardia	3	198 Primula	17
158	Trapa	2	199 Cortusa	5
159	Cometes	1	200 Soldanella	1
160	Elæagnus	4	201 Dodecatheon	1
161	Santalum	1	202 Cyclamen	2
162	Struthiola	6	203 Menyanthes	5
163	Rivina	3	204 Hottonia	3
164	Salvadora	2	205 Hydrophyllum	4
165	Camphorosma	6	206 Ellisia	2
166	Alchemilla	5	207 Lysimachia	13
			208 Anagallis	8
			209 Retzia	2
	DIGYNIA.		210 Spigelia	3
167	Aphanes	3	211 Ophiorhiza	5
168	Bufonia	2	212 Virecta	2
169	Hamamelis	2	213 Lisianthus	3
170	Cuscuta	10		

	Sheets.		Sheets.		
214	Randia	1	263	Phyllica	16
215	Azalea	7	264	Ceanothus	8
216	Plumbago	3	265	Arduina	2
217	Phlox	13	266	Büttneria	2
218	Convolvulus	71	267	Myrsine	1
219	Ipomœa	16	268	Celastrus	8
220	Polemonium	6	269	Euonymus	8
221	Campanula	83	270	Diosma	39
222	Roella	2	271	Brunia	18
223	Phyteuma	2	272	Cyrilla	2
224	Trachelium	3	273	Itea	3
225	Samolus	2	274	Cedrela	2
226	Nauclea	2	275	Escallonia	1
227	Macrocnemum	1	276	Mangifera	5
228	Portlandia	1	277	Plectronia	2
229	Scaevola	1	278	Ribes	9
230	Cinchona	2	279	Aquilicia	3
231	Psychotria	7	280	Hedera	3
232	Coffea	1	281	Vitis	11
233	Chiococca	6	282	Lagœcia	1
234	Hamellia	1	283	Sauvagesia	2
235	Lonicera	16	284	Roridula	2
236	Morinda	3	285	Claytonia	4
237	Conocarpus	3	286	Heliconia	5
238	Kuhnia	2	287	Achyranthes	12
239	Mussaenda	3	288	Celosia	12
240	Mirabilis	3	289	Chenolea	3
241	Coris	2	290	Illecebrum	30
242	Verbascum	12	291	Glaux	1
243	Datura	5	292	Thesium	20
244	Hyoscyamus	9	293	Rauvolfia	4
245	Nicotiana	5	294	Pæderia	3
246	Atropa	7	295	Carissa	3
247	Physalis	17	296	Cerbera	4
248	Solanum	65	297	Gardenia	12
249	Capsicum	7	298	Allamanda	2
250	Strychnos	1	299	Vinca	5
251	Ignatia	2	300	Nerium	3
252	Chironia	14	301	Plumeria	2
253	Cordia	9	302	Echites	13
254	Ehretia	2	303	Cameraria	1
255	Varronia	3	304	Tabernæmontana	4
256	Laugeria	1	305	Ceropegia	4
257	Brunfelsia	1			
258	Cestrum	7		DIGYNIA.	
259	Lycium	13	306	Pergularia	3
260	Chrysophyllum	1	307	Periploca	11
261	Sideroxylon	10	308	Cynanchum	14
262	Rhamnus	45	309	Apocynum	9

	Sheets.		Sheets.		
310	Asclepias	52	359	Enanthe	7
311	Stapelia	2	360	Phellandrium	3
312	Herniaria	6	361	Cicuta	4
313	Chenopodium	30	362	Æthusa	7
314	Beta	3	363	Coriandrum	2
315	Salsola	51	364	Scandix	10
316	Anabasis	7	365	Chærophyllyum	14
317	Cressa	2	366	Imperatoria	1
318	Steris	1	367	Seseli	36
319	Gomphrena	3	368	Thapsia	5
320	Bosea	1	369	Pastinaca	3
321	Ulmus	7	370	Smyrnum	8
322	Nama	3	371	Anethum	7
323	Linconia	2	372	Carum	2
324	Schrebera	1	373	Pimpinella	16
325	Heuchera	1	374	Apium	3
326	Velezia	2	375	Ægopodium	1
327	Swertia	6	376	Cussonia	1
328	Gentiana	48			
329	Vahlia	3		TRIGYNIA.	
330	Phyllis	1	377	Semecarpus	1
331	Eryngium	12	378	Rhus	29
332	Hydrocotyle	20	379	Viburnum	12
333	Sanicula	2	380	Cassine	9
334	Astrantia	4	381	Sambucus	5
335	Bupleurum	33	382	Staphylea	2
336	Echinophora	2	383	Tamarix	4
337	Tordylium	7	384	Turnera	7
338	Caucalis	17	385	Telephium	1
339	Artemisia	2	386	Corrigiola	1
340	Daucus	14	387	Pharnaceum	9
341	Ammi	5	388	Alsine	5
342	Bunium	2	389	Drypis	1
343	Conium	7	390	Basella	1
344	Selinum	28	391	Sarothra	1
345	Athamanta	13			
346	Peucedanum	10		TETRAGYNIA.	
347	Crithmum	4	392	Parnassia	1
348	Hasselquistia	4	393	Evolvulus	7
349	Cachrys	11			
350	Ferula	7		PENTAGYNIA.	
351	Laserpitium	15	394	Aralia	7
352	Heracleum	15	395	Statice	37
353	Ligusticum	9	396	Linum	41
354	Angelica	9	397	Aldrovanda	1
355	Sium	11	398	Drosera	7
356	Sison	11	399	Gisekia	2
357	Bubon	3	400	Crassula	45
358	Cuminum	1	401	Sibbaldia	4

POLYGYNIA.		Sheets.			Sheets.
402	Myosurus	1	445	Gethyllis	1
			446	Hemerocallis	2
			447	Acorus	1
			448	Orontium	1
			449	Juncus	60
			450	Achras	2
			451	Richardia	1
403	Tillandsia	7	452	Prinos	5
404	Burmanna	2	453	Berberis	7
405	Lachenalia	2	454	Capura	1
406	Tradescantia	8	455	Loranthus	7
407	Pontederia	6	456	Canarina	1
408	Hæmanthus	3	457	Frankenia	9
409	Galanthus	3	458	Peplis	3
410	Leucojum	3	459	Gahnia	2
411	Tulbaghia	4			
412	Narcissus	14		DIGYNIA.	
413	Pancratium	5	460	Oryza	1
414	Massonia	2	461	Falckia	1
415	Crinum	7	462	Atraphaxis	3
416	Amaryllis	9			
417	Bulbocodium	1		TRIGYNIA.	
418	Aphyllanthes	2	463	Flagellaria	1
419	Allium	42	464	Rumex	47
420	Lilium	9	465	Scheuchzeria	2
421	Fritillaria	3	466	Triglochin	3
422	Uvularia	4	467	Melanthium	17
423	Gloriosa	2	468	Medeola	3
424	Erythronium	2	469	Trillium	3
425	Tulipa	4	470	Colchicum	2
426	Albuca	4	471	Helonias	2
427	Hypoxis	19			
428	Ornithogalum	22		TETRAGYNIA.	
429	Scilla	15	472	Petiveria	2
430	Cyanella	5			
431	Asphodelus	6		POLYGYNIA.	
432	Anthericum	27	473	Alisma	9
433	Leontice	5			
434	Asparagus	19		HEPTANDRIA.	
435	Dracæna	5		MONOGYNIA.	
436	Convallaria	8	474	Trientalis	3
437	Polianthes	1	475	Disandra	5
438	Hyacinthus	17	476	Æsculus	2
439	Phormium	3			
440	Aletris	5		DIGYNIA.	
441	Yucca	2	477	Limeum	2
442	Aloe	2			
443	Agave	2			
444	Alstrœmeria	2			

TETRAGYNIA.			TETRAGYNIA.		
		Sheets.			Sheets.
478	Saururus	1	515	Paris	1
479	Aponogeton	3	516	Adoxa	1
	HEPTAGYNIA.		517	Elatine	3
480	Septas	3		ENNEANDRIA.	
	OCTANDRIA.			MONOGYNIA.	
	MONOGYNIA.		518	Laurus	25
			519	Cassyta	3
481	Tropæolum	8		TRIGYNIA.	
482	Osbeckia	1	520	Rheum	5
483	Rhexia	8		HEXAGYNIA.	
484	Enothera	10	521	Butomus	1
485	Gaura	1		DECANDRIA.	
486	Epilobium	11		MONOGYNIA.	
487	Antichorus	1	522	Sophora	22
488	Melicocca	1	523	Anagyris	2
489	Guarea	1	524	Cercis	2
490	Amyris	2	525	Bauhinia	6
491	Ximenia	1	526	Hymenæa	1
492	Mimusops	2	527	Parkinsonia	2
493	Memecylon	1	528	Cassia	41
494	Chlora	3	529	Poinciana	5
495	Dodonæa	6	530	Cæsalpinia	2
496	Lawsonia	2	531	Guilandina	7
497	Vaccinium	22	532	Guaiacum	4
498	Erica	125	533	Cynometra	1
499	Ophira	4	534	Anacardium	2
500	Daphne	18	535	Codon (drawing).	
501	Dirca	1	536	Dictamnus	2
502	Gnidia	17	537	Ruta	5
503	Stellera	1	538	Hæmatoxylon	2
504	Passerina	16	539	Murræa	2
505	Bacckea	1	540	Adenanthera	2
	DIGYNIA.		541	Trichilia	1
506	Schmidelia	1	542	Swietenia	2
507	Galenia	3	543	Melia	3
508	Weinmannia	2	544	Zygophyllum	7
509	Mœhringia	1	545	Quassia	4
	TRIGYNIA.		546	Fagonia	1
510	Polygonum	45	547	Tribulus	5
511	Coccoloba	3	548	Bergera	2
512	Paullinia	11	549	Turræa	1
513	Cardiospermum	3			
514	Sapindus	6			

	Sheets.		Sheets.	
550	Limonia	6	593 Spondias	1
551	Monotropa	3	594 Cotyledon	8
552	Jussiaea	5	595 Sedum	11
553	Quisqualis	2	596 Penthorum	1
554	Dais	2	597 Bergia	2
555	Dionæa	1	598 Suriana	3
556	Bucida	1	599 Grielum	2
557	Copaifera	2	600 Oxalis	14
558	Samyda	2	601 Agrostemma	3
559	Melastoma	16	602 Lychnis	16
560	Kalmia	2	603 Cerastium	33
561	Ledum	2	604 Spergula	6
562	Rhododendron	6	605 Forskohlea	3
563	Andromeda	23		
564	Epigæa	1		DECAGYNIA.
565	Gaultheria	1	606 Neurada	1
566	Arbutus	7	607 Phytolacca	5
567	Clethra	1		
568	Pyrola	9		DODECANDRIA.
569	Styrax	3		MONOGYNIA.
	DIGYNIA.			
570	Royena	9	608 Asarum	2
571	Cunonia	2	609 Bocconia	2
572	Trianthema	4	610 Bassia	1
573	Hydrangea	2	611 Rhizophora	3
574	Chrysosplenium	2	612 Blakea	2
575	Saxifraga	64	613 Befaria	2
576	Tiarella	2	614 Vatica	2
577	Mitella	2	615 Garcinia	2
578	Scleranthus	3	616 Halesia	3
579	Gypsophila	26	617 Decumaria	2
580	Saponaria	10	618 Winterania	1
581	Dianthus	28	619 Cratæva	4
	TRIGYNIA.		620 Triumfetta	3
582	Cucubalus	24	621 Peganium	2
583	Silene	76	622 Hudsonia	1
584	Stellaria	17	623 Dodecas	1
585	Arenaria	72	624 Nitraria	2
586	Cherleria	3	625 Portulaca	6
587	Garidella	1	626 Lythrum	20
588	Malpighia	18		DIGYNIA.
589	Banisteria	6	627 Heliocarpus	1
590	Triopteris	1	628 Agrimonia	5
591	Erythroxylon	2		TRIGYNIA.
	PENTAGYNIA.			
592	Averrhoa	4	629 Reseda	29
			630 Euphorbia	98

PENTAGYNIA.		POLYANDRIA.	
	Sheets.		
631	Glinus 1		
DODECAGYNIA.		MONOGYNIA.	
			Sheets.
632	Sempervivum 3	661	Marcgravia 1
ICOSANDRIA.		662	Ternstroemia 2
MONOGYNIA.		663	Alstonia 2
633	Cactus 7	664	Capparis 10
634	Philadelphus 1	665	Actæa 3
635	Psidium 8	666	Sanguinaria 2
636	Eugenia 5	667	Podophyllum 2
637	Myrtus 23	668	Chelidonium 7
638	Punica 2	669	Papaver 10
639	Amygdalus 7	670	Argemone 1
640	Prunus 26	671	Cambogia (in Asclep.). 1
641	Chrysobalanus 3	672	Muntingia 2
642	Plinia 2	672 ^a	Sarracenia (empty).
DIGYNIA.		673	Nymphæa 8
643	Cratægus 20	674	Bixa 1
TRIGYNIA.		675	Mammæa 3
644	Sorbus 6	676	Calophyllum 3
645	Sesuvium 1	677	Sparmannia 3
PENTAGYNIA.		678	Vallea 1
646	Mespilus 25	679	Tilia 3
647	Pyrus 9	680	Lætia 1
648	Tetragonia 4	681	Elæocarpus 2
649	Mesembryanthemum. 17	682	Lecythis 1
650	Aizoon 6	683	Delima 2
651	Spiræa 25	684	Lagerstroemia 2
POLYGYNIA.		685	Thea 4
652	Rosa 47	686	Caryophyllus 1
653	Rubus 24	687	Mentzelia 1
654	Fragaria 22	688	Loasa 1
655	Potentilla 47	689	Cistus 78
656	Tormentilla 2	690	Prockia 1
657	Geum 7	691	Corchorus 10
658	Dryas 3	DIGYNIA.	
659	Comarum 1	692	Pæonia 4
660	Calycanthus 2	693	Fothergilla 3
		TRIGYNIA.	
		694	Delphinium 13
		695	Aconitum 9
		TETRAGYNIA.	
		696	Wintera 5
		697	Tetracera 1
		698	Cimicifuga 2

PENTAGYNIA.			Sheets.			Sheets.
699	Aquilegia	5	738	Marrubium	15	
700	Nigella	8	739	Leonurus	8	
701	Reaumuria	1	740	Phlomis	22	
702	Brathys	1	741	Moluccella	5	
			742	Clinopodium	4	
			743	Origanum	16	
	HEXAGYNIA.		744	Thymus	23	
703	Stratiotes	2	745	Melissa	9	
			746	Dracocephalum	20	
	POLYGYNIA.		747	Horminum	2	
704	Illicium	1	748	Melittis	1	
705	Liriodendron	1	749	Ocymum	20	
706	Magnolia	4	750	Trichostema	3	
707	Michelia	5	751	Scutellaria	18	
708	Anona	13	752	Prunella	6	
709	Unona	2	753	Cleonia	2	
710	Anemone	35	754	Prasium	5	
711	Atragene	7	755	Phryma	3	
712	Clematis	17		ANGIOSPERMIA.		
713	Thalictrum	31	756	Bartsia	4	
714	Adonis	9	757	Castilleja	2	
715	Ranunculus	78	758	Rhinanthus	12	
716	Trollius	2	759	Euphrasia	7	
717	Isopyrum	1	760	Melampyrum	6	
718	Helleborus	8	761	Lathræa	3	
719	Caltha	2	762	Tozzia	2	
720	Hydrastis	2	763	Pedicularis	33	
			764	Gerardia	9	
	DIDYNAMIA.		765	Chelone	3	
	GYMNOSPERMIA.		766	Gesneria	3	
721	Ajuga	12	767	Antirrhinum	76	
722	Teucrium	48	768	Cymbaria	1	
723	Satureja	13	769	Martynia	3	
724	Thymbra	2	770	Torenia	5	
725	Hyssopus	4	771	Besleria	3	
726	Nepeta	31	772	Hemimeris	6	
727	Lavandula	8	773	Scrophularia	20	
728	Hediosma [g. ined.]	3	774	Celsia	6	
729	Sideritis	22	775	Digitalis	10	
730	Mentha	25	776	Bignonia	12	
731	Perilla	3	777	Citharexylon	6	
732	Glechoma	1	778	Halleria	1	
733	Lamium	12	779	Crescentia	2	
734	Galeopsis	5	780	Gmelina	3	
735	Betonica	7	781	Petrea	1	
736	Stachys	32	782	Premna	6	
737	Ballota	8	783	Lantana	10	
			784	Cornutia	2	

	Sheets.		Sheets.		
785	Capraria	6	830	Clypeola	5
786	Selago	17	831	Biscutella	8
787	Manulea	17	832	Lunaria	2
788	Hebenstretia	10			
789	Erinus	5		SILIKUOSA.	
790	Buchnera	16	833	Ricotia	6
791	Browallia	3	834	Dentaria	4
792	Linnæa	2	835	Cardamine	18
793	Sibthorpia	6	836	Sisymbrium	64
794	Limosella	3	837	Erysimum	10
795	Vandellia	3	838	Chamira	1
796	Lindernia	3	839	Cheiranthus	33
797	Stemodia	3	840	Heliophila	12
798	Orobanche	12	841	Hesperis	6
799	Hyobanche	4	842	Arabis	15
800	Dodartia	3	843	Turritis	4
801	Lippia	3	844	Brassica	23
802	Sesamum	4	845	Sinapis	21
803	Mimulus	1	846	Raphanus	7
804	Ruellia	27	847	Bunias	16
805	Barleria	14	848	Isatis	2
806	Duranta	3	849	Crambe	5
807	Ovieda	2	850	Cleome	24
808	Millingtonia	2			
809	Volkameria	6		MONADELPHIA.	
810	Clerodendrum	9		TRIANDRIA.	
811	Vitex	9	851	Galaxia	6
812	Bontia	1			
813	Avicennia	3		PENTANDRIA.	
814	Columnnea	1	851 ^a	Lerchea	2
815	Thunbergia	2	852	Waltheria	4
816	Acanthus	13	853	Symphonia	1
817	Pedaliu	2	854	Hermannia	23
818	Melianthus	4	855	Melochia	8
	TETRADYNAMIA.			DECANDRIA.	
	SILICULOSA.		856	Connarus	1
819	Myagr	19	857	Hugonia	2
820	Vella	3	858	Geranium	101
821	Anastatica	3	859	Brownea	5
822	Subularia	2			
823	Draba	14		DODECANDRIA.	
824	Lepidium	28	860	Pentapetes	1
825	Thlaspi	16	861	Plagianthus	1
826	Cochlearia	8			
827	Iberis	15		POLYANDRIA.	
828	Alyssum	30	862	Adansonia	1
829	Peltaria	4	863	Gustavia	4

	Sheets.
864 Barringtonia	1
865 Carolinea	1
866 Sida	39
867 Malachra	1
868 Althæa	4
869 Alcea	3
870 Malva	34
871 Lavatera	11
872 Malope	1
873 Urena	10
874 Gossypium	7
875 Hibiscus	42
876 Stewartia	4
877 Gordonia	2
878 Camellia	1
879 Mesua	1

DIADELPHIA.

HEXANDRIA.

880 Saraca	1
881 Fumaria	15

OCTANDRIA.

882 Polygala	50
883 Securidaca	4

DECANDRIA.

884 Nissolia	4
885 Abrus	1
886 Dalbergia	4
887 Pterocarpus	7
888 Erythrina	6
889 Piscidia	1
890 Borbonia	2
891 Spartium	17
892 Genista	30
893 Aspalathus	57
894 Amorpha	2
895 Crotalaria	42
896 Ononis	38
897 Anthyllis	18
898 Lupinus	8
899 Phaseolus	13
900 Dolichos	22
901 Glycine	26
902 Clitoria	6
903 Pisum	3

	Sheets.
904 Orobus	10
905 Lathyrus	28
906 Vicia	37
907 Ervum	8
908 Cicer	2
909 Arachis	1
910 Liparia	12
911 Muellera	1
912 Cytisus	26
913 Robinia	9
914 Colutea	9
915 Ulex	3
916 Glycyrrhiza	5
917 Coronilla	16
918 Ornithopus	6
919 Hippocrepis	5
920 Scorpiurus	4
921 Hedysarum	79
922 Æschynomene	18
923 Indigofera	27
924 Galega	12
925 Phaca	20
926 Astragalus	88
927 Biserrula	1
928 Psoralea	27
929 Ebenus	2
930 Trifolium	69
931 Lotus	36
932 Trigonella	19
933 Medicago	27

POLYADELPHIA.

DECANDRIA.

934 Theobroma	4
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DODECANDRIA.

935 Abroma	2
936 Monsonia	5

ICOSANDRIA.

937 Citrus	6
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POLYANDRIA.

938 Glabraria	1
939 Muenchhausia	3
940 Durio	1
941 Melaleuca	6

		Sheets.				SUPERFLUA.				Sheets.	
942	Hopea		3			987	Tanacetum		11		
943	Hypericum		51			988	Artemisia		61		
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957	Hyoseris		13			1004	Mutisia		1		
958	Seriola		1			1005	Helenium		2		
959	Hypochaeris		6			1006	Bellis		5		
960	Lapsana		4			1007	Bellium		2		
961	Catananche		3			1008	Leysera		6		
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963	Scolymus		5			1010	Unxia		1		
964	Arctium		3			1011	Pectis		2		
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1032	Silphium	1069	Ayenia
1033	Polymnia	1070	Passiflora
1034	Melampodium		
1035	Calendula		HEXANDRIA.
1036	Arctotis	1071	Aristolochia
1037	Osteospermum	1072	Pistia
1038	Othonna		
1039	Hippia		DECANDRIA.
1040	Ericephalus	1073	Kleinhovia
1041	Filago	1074	Helicteres
1042	Micropus		
	SEGREGATA.		DODECANDRIA.
1043	Elephantopus	1075	Cytinus
1044	Sphæranthus		
1045	Echinops		POLYANDRIA.
1046	Jungia	1076	Grewia
1047	Cedera	1077	Xylopia
1048	Stoebe	1078	Ambrosinia
	MONOGAMIA.	1079	Arum
1049	Seriphium	1080	Dracontium
1050	Jasione	1081	Calla
1051	Lobelia	1082	Pothos
1052	Viola	1083	Zostera
1053	Impatiens		
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	DIANDRIA.		MONANDRIA.
1054	Orchis	1084	Cynomorium
1055	Satyrium	1085	Zannichellia
1056	Ophrys	1086	Ceratocarpus
1057	Serapias	1087	Artocarpus
1058	Limodorum	1088	Chara
1059	Arethusa	1089	Phyllachne
1060	Disa	1090	Casuarina
1061	Cypripedium	1091	Ægopricum
1062	Epidendrum		
1063	Gunnera		DIANDRIA.
	TRIANDRIA.	1092	Anguria
1064	Sisyrinchium	1093	Lemna
1065	Ferraria		
1066	Salacia		TRIANDRIA.
1067	Stilago	1094	Typha
		1095	Sparganium
		1096	Zea
		1097	Tripsacum
		1098	Coix

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1101	Axyris	6	1139	Acalypha	7
1102	Omphalea	1	1140	Croton	25
1103	Tragia	8	1141	Jatropha	16
1104	Hernandia	4	1142	Ricinus	2
1105	Phyllanthus	14	1143	Sterculia	1
	TETRANDRIA.		1144	Hura	2
1106	Serpicula	2	1145	Agyneja	7
1107	Littorella	2	1146	Hippomanes	4
1108	Cicca	2	1147	Stillingia	1
1109	Betula	15	1148	Gnetum	2
1110	Buxus	1		SYNGENESIA.	
1111	Urtica	27	1149	Trichosanthes	1
1112	Morus	10	1150	Momordica	13
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1113	Xanthium	4	1152	Cucumis	14
1114	Ambrosia	4	1153	Bryonia	17
1115	Parthenium	2	1154	Sicyos	3
1116	Iva	3		GYNANDRIA.	
1117	Amaranthus	36	1155	Andrachne	3
1118	Leea	2		DIECIA.	
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1120	Pharus	1		DIANDRIA.	
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1121	Guettarda	1	1158	Salix	125
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1122	Ceratophyllum	3		TRIANDRIA.	
1123	Myriophyllum	4	1160	Empetrum	2
1124	Sagittaria	7	1161	Osyris	4
1125	Begonia	3	1162	Excœcaria	2
1126	Theligonum	1	1163	Caturus	1
1127	Poterium	3	1164	Restio	25
1128	Quercus	35		TETRANDRIA.	
1129	Juglans	5	1165	Trophis	1
1130	Fagus	4	1166	Viscum	13
1131	Carpinus	4	1167	Montinia	2
1132	Corylus	4	1168	Hippophaë	3
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1171	Zanthoxylum	6	1204	Myristica	1
1172	Canarium	1		SYNGENESIA.	
1173	Antidesma	2	1205	Ruscus	6
1174	Spinacia	2		GYNANDRIA.	
1175	Iresine	1	1206	Clutia	15
1176	Acnida	2		POLYGAMIA.	
1177	Cannabis	2		MONÆCIA.	
1178	Humulus	3			
1179	Zanonia	1	1207	Musa	2
1180	Fevillea	1	1208	Ophioxylon	2
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1181	Tamus	3	1210	Veratrum	3
1182	Smilax	20	1211	Andropogon	32
1183	Rajania	1	1212	Holcus	16
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1189	Hydrocharis	2	1220	Parietaria	9
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1191	Kiggelaria	4	1223	Brabejum	2
1192	Coriaria	1	1224	Clusia	5
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1202	Cissampelos	3	1236	Pisonia	4
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Hieracium	954	Itea	273
Hippia	1039	Iva	1116
Hippocrepis	919	Ixia	58
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Hippophaë	1168	Jasione	1050
Hippuris	11	Jasminum	17
Holcus	1212	Jatropha	1141
Holosteum	942	Juglans	1129
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Horminum	747	Jungermannia	1267
Hottonia	204	Jungia	1046
Houstonia	128	Juniperus	1198
Hudsonia	622	Jussiaea	552
Hugonia	857	Justicia	28
Humulus	1178	Kæmpferia	8
Hura	1144	Kalmia	560
Hyacinthus	438	Kiggelaria	1191
Hydnum	1281	Kleinhovia	1073
Hydrangea	573	Knautia	121
Hydrastis	720	Kœnigia	110
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Kyllinga	69	Loasa	688
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Lactuca	950	Loeflingia	54
Laëtia	680	Lolium	99
Lagerstrœmia	684	Lonchitis	1249
Lagœcia	282	Lonicera	235
Lagurus	96	Loranthus	455
Lamium	733	Lotus	931
Lantana	783	Ludwigia	154
Lapsana	960	Lunaria	832
Laserpitium	351	Lupinus	898
Lathrœa	761	Lychnis	602
Lathyrus	905	Lycium	259
Laugeria	256	Lycoperdon	1287
Laurus	518	Lycopodium	1257
Lavandula	727	Lycopsis	190
Lavatera	871	Lycopus	36
Lawsonia	496	Lygeum	75
Lechia	115	Lysimachia	207
Lecythis	682	Lythrum	626
Ledum	561		
Leea	1118	Macrocnemum	227
Lemna	1093	Magnolia	706
Leontice	433	Malachra	867
Leontodon	953	Malope	872
Leonurus	739	Malpighia	588
Lepidium	824	Malva	870
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Leucojum	410	Mangifera	276
Leysera	1008	Manisuris	1215
Lichen	1273	Manulea	787
Ligusticum	353	Maranta	6
Ligustrum	18	Marcgravia	661
Lilium	420	Marchantia	1269
Limeum	477	Margaritaria	1187
Limodorum	1058	Marrubium	738
Limonia	550	Marsilea	1254
Limosella	794	Martynia	769
Linconia	323	Massonia	414
Lindernia	796	Matricaria	1013
Linnœa	792	Mauritia	1290
Linum	396	Medeola	468
Liparia	910	Medicago	933
Lippia	801	Melaleuca	941
Liquidambar	1134	Melampodium	1034
Liriodendron	705	Melampyrum	760
Lisianthus	213	Melanthium	467
Lithospermum	181	Melastoma	559
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		Melianthus	818

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Melothria	51	Myriophyllum	1123
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Millingtonia	808	Nigella	700
Mimosa	1228	Nissolia	884
Mimulus	803	Nitraria	624
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Minuartia	113	Nyctanthes	16
Mirabilis	240	Nymphæa	673
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Moluccella	741	Ænothera	484
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Monarda	40	Olea	20
Monotropa	551	Olyra	1099
Monsonia	936	Omphalea	1102
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Morina	44	Onosma	187
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Mussaenda	239	Ornithopus	918

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Oryza	460	Pharus	1120
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Osmites	1029	Phaseolus	899
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Othonna	1038	Phleum	81
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		Phoenix	1291
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Pancratium	413	Phyllanthus	1105
Panicum	80	Phyllis	330
Papaver	669	Physalis	247
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Parnassia	392	Pilularia	1255
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Peucedanum	346	Polygala	882
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Pommereulla	74	Rhinanthus	758
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Poterium	1127	Richardia	451
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		Sagittaria	1124
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Queria	114	Salix	1158
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		Salvadora	164
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Serpicula	1106	Stellera	503
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Swietenia	542	Trichosanthos	1149
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Syringa	22	Trifolium	930
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Tamus	1181	Triplaris	108
Tanacetum	987	Tripsacum	1097
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Targionia	1268	Triumfetta	620
Taxus	1199	Trollius	716
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Terminalia	1222	Trophis	1165
Ternstroemia	662	Tulbaghia	411
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Tetragonia	648	Turnera	384
Teucrium	722	Turræa	549
Thalictrum	713	Turritis	843
Thapsia	368	Tussilago	995
Thea	685	Typha	1094
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Theobroma	934	Ulmus	321
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Tilia	679	Uvularia	422
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Tillandsia	403	Vahlia	329
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Torenia	770	Valeriana	48
Tormentilla	656	Vallea	678
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Veronica	26	Xylopia	1077
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Virecta	212	Zannichellia	1085
Viscum	1166	Zanonia	1179
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Volkameria	809	Zinnia	1019
		Zizania	1119
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Weinmannia	508	Zostera	1083
Wintera	696	Zygophyllum	544

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1897.

— A Revision of the Pliocene non-Marine Mollusca of England. Pp. 18; figs. 4.

1899.

— Notes on *Paludestrina Jenkinsi* (Smith) and *P. confusa* (Frauenf.). Pp. 4.

1899.

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1900.

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1906.

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1906.

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DONATIONS IN AID OF PUBLICATIONS.

1907.	£	s.	d.
April 18. THE ROYAL SOCIETY. Third grant in aid of Dr. G. HERBERT FOWLER'S "Biscayan Plankton" (Trans. 2nd ser., Zool. vol. x.)	50	0	0
June 11. The Trustees of the PERCY SLADEN MEMORIAL FUND. First grant in aid of Mr. J. STANLEY GARDINER'S Expedition to the Indian Ocean in 1905 (Trans. 2nd ser., Zool. vol. xii.)	200	0	0

BENEFACTIONS.

LIST *in accordance with Bye-Laws, Chap. XVII. Sect. 1, of all Donations of the amount or value of Twenty-five pounds and upwards.*

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Cost of Copper and engraving of the plates of the first volume of Transactions, 20 in number.

The same: Medallion of C. von Linné, by C. F. Inlander.

1796.

The same: a large collection of books.

1800.

Subscription towards the Charter, £295 4s. 6d.

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1802.

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His collections, and £200 Stock.

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1814.

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Portrait of C. von Linné, after A. Roslin, reversed.

Dr. John Sims.

Portrait of Dr. Trew.

1818.

Subscription of £215 6s. for Caley's Zoological Collection.

1819.

The Medical Society of Stockholm.

A medallion of Linnæus in alabaster.

1822.

Bust of Sir Joseph Banks, by Sir F. Chantrey, R.A.

Subscription of the Fellows.

1825.

The late Natural History Society.

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Bust of Sir James Edward Smith, P.L.S., by Sir F. Chantrey,
R.A., by Subscribers.

1829.

Subscription for the purchase of the Linnean and Smithian
Collections, £1593 8s.

1830.

Sir Thomas Grey Cullum, Bart.

£100 Bond given up.

1832.

The Honourable East India Company.

East Indian Herbarium (Wallichian Collection).

1833.

Subscription for Cabinets and mounting the East Indian Herbarium,
£315 14s.

1835.

Subscription portrait of Robert Brown, by H. W. Pickersgill, R.A.

1836.

Subscription portrait of Edward Forster, by Eden Upton Eddis.

Subscription portrait of Archibald Menzies, by E. U. Eddis.

1837.

Subscription portrait of Alexander MacLeay, by Sir Thomas
Lawrence, P.R.A.

1838.

Collections and Correspondence of Nathaniel John Winch.

Portrait of Dr. Nathaniel Wallich, by John Lucas, presented by
Mrs. Smith, of Hull.

1839.

Subscription portrait of William Yarrell, by Mrs. Carpenter.

1842.

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Portrait of John Ebenezer Bicheno, by E. U. Eddis, presented by
Mr. Bicheno.

1843.

Subscription in aid of the funds of the Society, £994 3s.

Subscription portrait of Sir William Jackson Hooker, by S. Gambardella.

1845.

Microscope presented by Subscribers.

1846.

Joseph Janson: £100 legacy, free of duty, and two cabinets.

1847.

[Bequest of £200 in trust, by Edward Rudge; declined for reasons set forth in Proceedings, i. pp. 315-317.]

1849.

Portrait of Sir J. Banks, Bart., by T. Phillips, R.A., presented by Capt. Sir E. Home, Bart., R.N.

1850.

Subscription portrait of the Rt. Rev. Edward Stanley, D.D., Bishop of Norwich, by J. H. Maguire.

1853.

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Pastel portrait of A. B. Lambert, by John Russell, presented by Robert Brown.

1854.

Professor Thomas Bell, £105.

1857.

Subscription portrait of Prof. T. Bell, P.L.S., by H. W. Pickersgill, R.A.

Thomas Corbyn Janson: two cabinets to hold the collection of fruits and seeds.

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1858.

Subscription portrait of Nathaniel Bagshaw Ward, by J. P. Knight.

Subscription for removal to Burlington House, £1108 15s.

Diary of Carl von Linné, and letters to Bishop Menander, presented by Miss Wray.

Dr. Horsfield's Javan plants, presented by the Court of Directors of the Hon. East India Company.

Dr. Ferdinand von Mueller's Australian and Tasmanian plants, including many types.

1859.

Books from the library of Robert Brown, presented by J. J. Bennett, Sec.L.S.

Robert Brown: two bonds given up, £200.

1861.

Subscription bust of Robert Brown, by Peter Slater.

Collection of birds' eggs, bequeathed by John Drew Salmon, F.L.S.

1862.

The Linnean Club: presentation bust of Prof. T. Bell, by P. Slater.

1863.

Subscription portrait of John Joseph Bennett, by E. U. Eddis.

1864.

Beriah Botfield, Esq.: Legacy, £40 less Duty.

1865.

Executors of Sir J. W. Hooker, £100.

George Bentham, Esq.: cost of 10 plates for his "Tropical Leguminosæ," Trans. vol. xxv.

1866.

Dr. Friedrich Welwitsch: Illustrations of his 'Sertum Angolense,' £130.

1867.†

George Bentham, Esq.: General Index to Transactions, vols. i.-xxv.

Royal Society: Grant in aid of G. S. Brady on British Ostracoda, £80.

1869.

Carved rhinoceros horn from Lady Smith, formerly in the possession of C. v. Linné.

1874.

Subscription portrait of George Bentham, by L. Dickinson.

George Bentham, Esq., for expenditure on Library, £50.

1875.

Legacy from James Yates, £50 free of Duty.

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1876.

Legacy of the late Thomas Corbyn Janson, £200.

„ „ „ Charles Lambert, £500.

George Bentham, Esq.: General Index to Transactions, vols. xxvi.-xxx.

1878.

Subscription portrait of John Claudius Loudon, by J. Linnell.

Subscription portrait of Rev. Miles Joseph Berkeley, by James Peel.

1879.

Rev. George Henslow and Sir J. D. Hooker: Contribution to illustrations, £35.

1880.

The Secretary of State for India in Council: cost of setting up Dr. Aitchison's paper, £36.

1881.

George Bentham, Esq., special donation, £25.

The same: towards Richard Kippist's pension, £50.

Portrait of Dr. St. George Jackson Mivart, by Miss Solomon; presented by Mrs. Mivart.

1882.

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The Secretary of State for India in Council: Grant for publication of Dr. Aitchison's second paper on the Flora of the Kurrum Valley, £60.

1883.

Sir John Lubbock, Bart. (afterwards Lord Avebury).

Portrait of C. von Linné, ascribed to M. Hallman.

Philip Henry Gosse, Esq.: towards cost of illustrating his paper, £25.

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Sophia Grover, Harriet Grover, Emily Grover, and Charles Ehret Grover: 11 letters from C. von Linné to G. D. Ehret.

1885.

Executors of the late George Bentham, £567 11s. 2d.

Subscription portrait of George Busk, by his daughter Marian Busk.

1886.

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Sir George MacLeay, Bart.: MSS. of Alexander MacLeay and portrait of Rev. William Kirby.

1887.

William Davidson, Esq.: 1st and 2nd instalments of grant in aid of publication, £50.

Francis Blackwell Forbes, Esq., in aid of Chinese Flora, £25.

1888.

The Secretary of State for India in Council: Grant in aid of publication of results of the Afghan Boundary Delimitation Expedition, £150.

Dr. J. E. T. Aitchison, towards the same, £25.

Trustees of the Indian Museum: Mergui Archipelago report, for publication in Journal, £135.

Dr. John Anderson, for the same, £60.

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1889.

Bronze copy of model for Statue of C. von Linné, by J. F. Kjellberg ;
presented by Frank Crisp, Esq.

1890.

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Expedition report, £200.

Oak table for Meeting Room, presented by Frank Crisp, Esq.

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1892.

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1893.

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1894.

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1896.

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Esq.

1897.

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Subscription portrait of Professor George James Allman, by
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1898.

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Stipules, £43 14s. 9d.

Royal Society : Contribution towards Cole's paper, £50.

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1899.

A. C. Harmsworth, Esq. [Lord Northcliffe] : Contribution towards cost of plates, £43.

Royal Society : Contribution towards Mr. R. T. Günther's paper on Lake Urmi, £50.

1901.

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Royal Society : Contribution towards Mr. F. Chapman's paper on Funafuti Foraminifera, £50.

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1903.

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Mrs. Sladen : Posthumous Portrait of the late Walter Percy Sladen, by H. T. Wells, R.A.

B. Arthur Bensley, Esq. : Contribution to his paper, £44.

1904.

Royal Society : Grant in aid of third volume of the Chinese Flora, £120.

Supplementary Royal Charter : cost borne by Frank Crisp, Esq.

1905.

Royal Society : First grant in aid of Dr. G. H. Fowler's 'Biscayan Plankton,' £50.

Executors of the late G. B. Buckton, Esq. : Contribution for colouring plates of his paper, £26.

1906.

Royal Society : Second grant towards 'Biscayan Plankton,' £50.

Subscription portrait of Prof. S. H. Vines, by Hon. John Collier.

Royal Swedish Academy of Sciences : Copies of portraits of C. von Linné, after Per Krafft the elder, and A. Roslin, by Jean Haagen.

1907.

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Royal Society : Third and final grant towards 'Biscayan Plankton,' £50.

The Trustees of the Percy Sladen Memorial Fund : First Grant towards publication of Mr. Stanley Gardiner's Researches in the Indian Ocean in H.M.S. 'Sealark,' £200.

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- Dawe, M. T., elected, 1.
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- De Man, Dr. J. G., Crustacea from Japan, 2.

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- Druce, H., appointed Scrutineer, 11; presented carpet, 1; elected Auditor, 13, *cf.* 17.
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- Elmhirst, R., elected, 14; proposed, 12.
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- Evans, I. B. P., elected, 58; proposed, 14.
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- Fjærlands Fjord, Norway (Monckton), 4.
- Flora and Fauna of Abyssinia (Poulton), 15.
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- Foslie, M., Lithothamnium of the 'Sealark,' 72.
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- Gardiner, F. A., admitted, 71; elected, 58; proposed, 14.
- Gardiner, J. Stanley, admitted, 10; elected, 5; proposed, 1; Aves of 'Sealark' (with Gadow), 11; communications by (Borradaile), (Cameron), (Carpenter), (Forel), (Laidlaw), (Punnett), (himself and Gadow), 10-11; (Green) and (Foslie), 72; with O. Forster Cooper (Percy Sladen Trust Exped.): Description of the Expedition, I. Introduction, II. History and Equipment of the Expedition, III. Résumé of the Voyage and Work: Part I. Colombo to Mauritius, 10; Intro., Part II., 'Sealark,' 71; Photographs taken during the 'Sealark' expedition, 63.
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- Groves, H., appointed Scrutineer, 11, 34.
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„ 262, 1st Nov., 1906.

„ 263, 11th July, 1907.

„ (Zoology), „ 195, 24th May, 1907.

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List of [Fellows, Associates, and Foreign Members], 1906-1907.